S·A·E Journal

JUNE 1945

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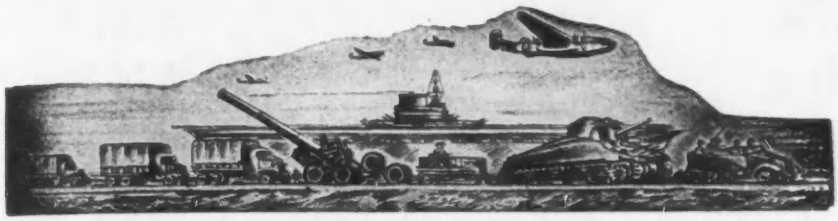

News of the **JULY** *Issue*

By Norman G. Shidle

Gorgeous Gray

ALMOST always there is something to be said on both sides. The truth about most things is gray – a mixture of black and white; of good and bad; of building up and tearing down.

Gray is gorgeous because it shines with the light of truth.

Most of us see things chiefly in blacks and whites. We are for this and against that. Habitually, we become protagonists or opponents; only occasionally analysts and seekers after truth.

The thrill of attack, the pride of defense subconsciously excite men as they approach a problem – or as an idea approaches them. The joy of crystal-clear definition before action is unknown to millions. The dynamics of balance intrigue the few. The excitement of unbalance beguiles the many. The glories of gray appeal infrequently to men of action.

Selected editorials by Mr. Shidle have been published under the title, "For the Sake of Argument."

This book is available to SAE members at 50¢, to non-members at $1, from Special Publications Department, Society of Automotive Engineers, 29 West 39th St., New York 18.

Yet the work of the world is accomplished only as conflicts are resolved. The most effective, if the least dramatic, activity is that in which conflicts are prevented from arising – or are limited to minimum areas. The executive, engineer, or supervisor who overcomes obstacles is a potent force in our economy. The one who maintains harmony and balance throughout his operations is even more potent.

To get consideration of both sides of a question before subordinates or associates have crossed wires or tempers is better than acting as a peacemaker or a straightener-outer. To get excited about the possibilities stemming from a set of research results as well as about the adverse aspects – and vice versa – is better than praising or damning.

Balance can be dynamic. Gray can be gorgeous.

There is gold in the golden mean.

Engineering Governs Future of Motor Bus

INTERESTING complexity of engineering, economics, and public relations is the urban motor bus. It operates in an aura of problems bordering upon the discouraging and renders public service more deserving of public appreciation than customarily it receives.

However lacking the motor bus may be in public appreciation, it is definitely headed for a leading role as a public necessity. Still its future is troubled by uncertainties. Prominent among them is the question whether motor bus line management ever can hope to be sufficiently able, agile, and rugged to find a way through a veritable maze of finance, legislation, politics, and public attitude further complicated by an automotive engineering job of no small proportions.

Engineering seems to be the foundation of the urban motor bus business. Any discussion of motor bus engineering currently borders upon the academic in the light of war's necessarily stifling effects upon civilian pursuits. Whatever happens engineeringwise to the motor bus indubitably must be postwar, but it looks as if plenty of motor bus engineering is going to be done then.

Primary objective is to make it possible for the vehicle to operate with sufficient economy to be self-amortizing in less than a decade, to produce sufficient revenue to meet normal operating expenses and an abnormal variety of taxes, and, finally, to pay interest charges sufficient to retain the support of capital.

There are other problems, each in search of an engineering solution. They include satisfying a prospective bus-riding public with a profound capacity for ire, impatience, and instability, and an amazingly vocal confidence in its own superior qualifications for bus line operation, management, and whatnot.

However, as Vice-President L. J. Fageol, of Twin Coach Co., will explain in an article to be published in July *SAE Journal*, post-war bus design has possibilities as well as limitations, and it rests with the engineer to make as much of the first as the second permits. Among his predictions for the post-war motor bus will be:

- Powerplants of approximately 200 hp, effectively offsetting passenger complaints of lethargic service.
- Fluid-type, two-way torque reacting transmissions, or equivalent mechanisms, which will contribute to preventing passengers from being too easily upset.
- Simplified rubber springing, providing riding ease regardless of road, reducing unsprung weight, eliminating lubricating, and avoiding body rattles and squeaks, as well as passengers' squawks.
- Axles lightened by use of heat-treated alloy housings.
- Brakes reduced in weight and cost, increased in effectiveness.
- Bodies, as commodious as the laws permit, incorporating ideas borrowed from aircraft construction.

Induction Heating Speeds Production

PROMISING post-war prospects for hardening by induction heating are heightened by substantial economies and conveniences to be described in July *SAE Journal* by H. B. Osborn, Jr., of TOCCO Division, Ohio Crankshaft Co.

Savings in manpower and in materials costs per unit, Mr. Osborn will explain, are augmented by operating efficiencies arising from the elimination of the necessity for maintaining heat sources between hardening jobs, for elaborate ventilating systems, for stand-by crews, and even for extensive floor space.

Make Progress in Altitude Cooling

ANALYSIS and prediction of engine cooling requirements for any given set of air and engine variables have reached a stage of development which assures knowledge and evaluation of cooling phenomena and contributes to improved cylinder and baffle design, it will be reported in July *SAE Journal*.

William M. S. Richards and Frank H. Erdman, of Wright Aeronautical Corp., will say that improved cylinder cooling design satisfactory for high-altitude operations already has achieved production, and that the "cooling correlation" method which they will describe is yielding important implications to engine cooling designers.

They will add that the correlation of entering and leaving air densities effectively counters variables which hitherto have proved to be misleading, and provides a method whereby cooling requirements for any set of operating conditions accurately can be expressed in one or all of three formulas.

Electronics Used In Brake Studies

ONE of the functional operations of aircraft which has defied human vision and, until recently, accurate analysis, is the application of the brakes. It has been relatively easy to see what happens before—and after—the brakes are applied, but only recently have electronics and photography pictured exactly what goes on during the braking operation.

Such knowledge always has been of primary importance. How it is being made available will be described in July *SAE Journal* by Duncan B. Gardiner, of Vickers, Inc.

Changes Echo Improvements

AMONG many features which make automotive engineering progress amazing is the multiple series of minor changes which precede, and follow, every major improvement.

For instance, conservative discussions of the post-war motor-vehicle engine point to such expected evolutionary changes as increased compression ratios, greater fuel economy, efficient operation both at high speeds and low, and automatic transmissions. Such changes, however they may avoid the radical, indicate to the automotive engineer that more than the engines must undergo at least some degree of metamorphosis.

One such item is the ignition system. Higher compression ratios mean an increase in voltage by at least 25%. Leaner mixtures mean higher spark-plug voltages. Engine designers, heading for 100,000 miles of trouble-free engine operation, demand ignition systems with equivalent longevity.

Some of these ignition engineering goals, and how possibly to reach them, will be discussed in July *SAE Journal* by H. L. Hartzell, of Delco-Remy Division, General Motors Corp. Mr. Hartzell will explain that the ignition system for the nine-to-one compression ratio 100,000-mile engine must be waterproofed, equipped with aluminum oxide spark-plug insulators, boosted to 12 v., provided with a breaker compartment protected from oil vapors and dirt.

Victory Furthered by Cooperative Research

OVERLOOKED by enemies in their peacetime surveys of American war resources was an intangible called, for want of a less bromidic name, cooperation. The spies can find an excuse for their failure, however. Cooperation customarily develops more directly from need than from plan. Its strength and results inevitably are *X* factors which preclude advance evaluation.

Case in point is the wartime work of the Coordinating Research Council, briefly to be described in July *SAE Journal by* C. B. Veal, CRC manager and secretary.

The Cover

GRAVEYARDS of yesterday's automotive transportation rear convincingly monticulate proof that post-war needs can be met only by employing the magic of mass production to transform designers' dreams and consumers' desires into realities.

Artist Lili Rethi's sketch on this month's cover is timely and symbolic of today's strange contrasts.

Even as millions of outmoded, outworn motor vehicles laggardly are driven to limbo, the engineering brains of the industry successively turn from the grim needs of producing for war to undertake modification of the designs and models of 1942 to meet the production possibilities of tomorrow.

Each interment is a monument to the failure of enemy threats to stagnate, stop, even destroy, a civilization built about the application of power to the rubber-shod wheel.

Probe Secrets of Wild Blue Yonder

EXPANDING field of knowledge is that "wild blue yonder" where the fighters and bombers range. Newspaper headlines tell of enemy air fleets destroyed and of great cities pulverized, but commonly overlook the prior technical research which enables military planes so to function.

World War II primarily is a battle of technologists. Victory appears to be accruing to that side whose technicians first successfully solve such involved problems as keeping the oil system operating in a military plane.

No glamor attaches to this job, but as W. L. Wheeler, of North American Aviation, Inc., will report in July *SAE Journal*, oil system problems must be solved if military planes are to have the advantages of operating at high altitudes. Loss of engine oil pressure, and of the oil itself, will be listed as basic difficulties. He will outline present engineering knowledge, recommend redesign of components, even of complete oil systems.

Progress Toward Vapor Lock Cure

NEW tools for designers of land, air, and water vehicles propelled by internal-combustion engines are formulas for measuring the vapor-forming characteristics of gasolines and the vapor-locking tendencies of fuel systems.

First tool is known as the "Temperature *V/L* Curve," which indicates what can be expected of the fuel. Second tool really is a method of using this curve to ascertain what is likely to happen when a given gasoline is used in a given fuel system under given conditions.

Story of the development of these tools, and of their practical application, will be told in July *SAE Journal* by E. W. Aldrich, of National Bureau of Standards; E. M. Barber, of The Texas Co.; and A. E. Robertson, of Standard Oil Development Co.

Additives Remedy Oil-Foaming Evil

FOAMING tendencies of engine oils and gear lubricants, with resulting mechanical ills, have been curbed by war-developed antifoam agents. They are said to do a better job than mechanical devices, and effectively to "tailor" oils without detracting from lubricating qualities. Another major advantage is found in the possibility of using available equipment without making mechanical modifications, yet with greater satisfaction.

Development of the agents and experiences with their use in military vehicles will be reviewed in July *SAE Journal* by H. A. Ambrose and G. E. Trautman, of Gulf Research & Development Co. Their article will comprise a progress report of the Group on Foaming, Engine Oil Division, CRC Coordinating Lubricants Research Committee.

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JUNE 1945

TRANSACTIONS SECTION

Post-War Advisory Committee Urges Establishment of

TECHNICAL BOARD

To Direct All SAE Technical Committee Work

by L. R. Buckendale, chairman,
Subcommittee on Technical Committee Organization,
SAE Post-War Advisory Committee

L. R. Buckendale

CREATION of an SAE Technical Board to exercise general direction and supervision of all SAE technical committee operations has been recommended to the Council by the Post-War Advisory Committee.

Purpose of the proposed Board is to give the SAE Council a single responsible body through which to administer the Society's technical committee work – as its meetings operations are administered through a General Meetings Committee, its membership activities through General Membership Committee, and other Society functions through similarly centralized groups. Experience in the handling of war projects has emphasized the many advantages possible from integration of technical committee work at the policy level, from clarification of procedures and interrelationships between various committees, and from preservation of freedom of action in the technical work of individual committees.

The design for the proposed Technical Board was drawn from SAE experience in directing and operating the vastly expanded technical committee activity demanded by World War II. As suggested, the Technical Board would combine supervisory functions – such as those exercised by the War Activity Council – with the operating practices and procedures applied so effectively by the War Engineering Board and the Aeronautics Division. So set up, the new Board is seen as an effective tool for use by

The SAE Post-War Advisory Committee (right) is studying many phases of SAE organization and operations; is stimulating study of other phases. First major recommendation to come from this distinguished group of SAE past-presidents is the proposal for an SAE Technical Board described in this article

The Post-War Advisory Committee assigned to its member, SAE Past-President J. H. Hunt, responsibility for making the study discussed in this article.

Mr. Hunt appointed L. R. Buckendale, Timken-Detroit Axle Co., as chairman of a working subcommittee to carry on the study—and named to serve with him the following 13 members, selected for their knowledge of and experience in SAE technical committee work:

J. M. Crawford, Chevrolet Division GMC; F. P. Gilligan, Henry Souther Engineering Co.; E. P. Gohn, Atlantic Refining Co.; W. H. Graves, Packard Motor Car Co.; W. C. Lawrence, American Export Airlines; G. W. Lewis, National Advisory Committee for Aeronautics; R. H. McCarroll, Ford Motor Co.; W. P. Michell, Mack Mfg. Corp.; Arthur Nutt, Packard Motor Car Co.; C. G. A. Rosen, Caterpillar Tractor Co.; T. C. Smith, American Telephone & Telegraph Co.; W. F. Strehlow, Allis-Chalmers Mfg. Co.; J. C. Zeder, Chrysler Corp.

the SAE Council in speeding reconversion to peacetime requirements and in carrying forward post-war technical work. Coordination of all technical committee work under the new Board is designed also to provide the best possible means for continuing after the peace the important permanent services to the military which already have been requested of the Society.

To fulfill these major objectives, the new Technical Board would be given broad authority (subject, of course, to the Council's ultimate authority) to organize and carry on all phases of the Society's technical committee work. It would be empowered to set up such standing and temporary technical working committees as may be necessary to handle the projects undertaken. Scopes for these working committees would be determined by the Board. Scope in any particular case might encompass standardization, research, or any other kind of appropriate cooperative engineering work. Thus, through the Board's integrating function, the limitations and possible conflicts inherent in the existing operations of a standards committee or a research committee would be eliminated – and the particular group of technicians selected to do a particular job would be freed to encompass all technical committee phases of their particular projects as indicated by project scopes designed to insure attainment of given objectives.

To achieve these desired ends, the new setup would involve:

1. Discontinuance of the General Standards, General Research, and Engineering Relations Committees – and transfer of their functions to the Technical Board;
2. Transfer of technical committee work now being carried on under Professional Activity Committees to the jurisdiction of the Technical Board;
3. Transfer of Special Technical Committees to the jurisdiction of the Technical Board.

Although these changes would benefit the Society materially in permitting a better coordinated operation of the technical committee work as a whole, they would make little difference in the practical functioning of many of the existing working committees. For example:

The present Iron and Steel Division of the General Standards Committee would presumably become simply the "Iron and Steel Committee" under the new set-up. As regards standardization, it would function exactly as in the past – except that it would report to the Technical Board instead of to a General Standards Committee. So in the case of other existing committees.

As time goes on and the need for any existing committee passes, it could be disbanded at the proper time by the Technical Board.

On the other hand, need for new committees will arise and opportunities will come for changes in the scope and direction of present committees. These new committees would be appointed and these new opportunities grasped promptly under the proposed new Technical Board procedures. In some cases the new committees would become "standing committees." In others, special project committee work would be wound up quickly and the committee disbanded. In this self-pruning feature of the new set-up, its sponsors see one of its important advantages.

The whole concept of the new Board's operation involves a gradual, rather than a sudden, detailing of the steps toward effective coordination of the Society's various technical committee operations under the Board's broad grant of authority. Such a gradual transition, particularly should Council make the proposal effective before final military victory, would not only assure the uninterrupted efficiency of the Society's war and post-war technical committee work, but might be expected to invigorate it. It is inherent in the thinking of the representative, committee-experienced group which evolved this Technical Board proposal that details of the final structure shall be worked out with active cooperation from members of existing SAE technical groups and with full consideration of the various engineering fields represented in the Society.

This latter end would be achieved through the composition of the Board itself. The personnel of the Board would be appointed by the SAE Council. It would consist of about 21 members, selected for their outstanding technical qualifications and drawn from the various branches of engineering within the Society's scope. Board members would be appointed for three-year terms, so arranged that the terms of one-third of its members would expire each year.

All technical committee reports would be subject to final action by this representative Board – which would also clear them for subsequent distribution and publication by the Publication Committee. Normally, the Board's decision on a technical committee report would constitute final action by the Society, but the right of appeal to the SAE Council, in case of disagreement, is definitely included in the proposed plan.

Technical advisory relations with Government agencies, trade associations, civic organizations and other outside groups – which always have been a major element of the Society's technical committee work, would come within the Board's purview, as would SAE participation in cooperative activity with other engineering organizations.

The proposal for establishment of this Technical Board resulted from intensive study of the Society's existing technical committee operations in relation both to current and post-war requirements in this vital area of Society activity.

It is the concept of the recommending committee that the Board, if established, must consist of members of outstanding caliber; that they individually and collectively must work diligently in the interests of the SAE; that they must individually have outstanding prestige in their particular fields of endeavor; and must possess executive and administrative ability.

The prestige of the Board, in other words, must be such that appointment to it would be an outstanding honor.

AIRCRAFT ACCESSORIES

Topic of Southern Ohio Aeronautic Meeting

by Robert L. Camping

ON April 24, the Southern Ohio Section of the SAE held its largest aeronautical meeting at the Dayton Engineers' Club. Nearly 200 engineers from Dayton and nearby attended the afternoon sessions on aircraft accessories and engines and the evening session on aircraft fuels.

During the presentation and discussion of the papers several trends and developments were mentioned which will undoubtedly affect future aircraft design. The following comments were typical:

"The ever-increasing dependence of the airplane upon electricity makes electrical-system reliability a rigid requirement."

"The development of a satisfactory, constant-speed generator drive for three-phase, 400-cycle power has revived the trend toward use of a-c power."

"The emphasis on comfort for the pilot or passengers will increase due to the development of equipment for recording and analyzing vibrations in flight."

"The achievement of the oil industry in producing large quantities of 100-octane fuel has resulted in a search for better fuels and production methods."

Lt.-Col. T. B. Holliday, chief of the equipment laboratory, Air Technical Service Command, presided over the session on aircraft accessories. In introducing the first speaker, he commented that Capt. R. J. Lusk, of the ATSC Laboratory, was largely responsible for the increased attention accorded to the protection of electrical systems in airplanes.

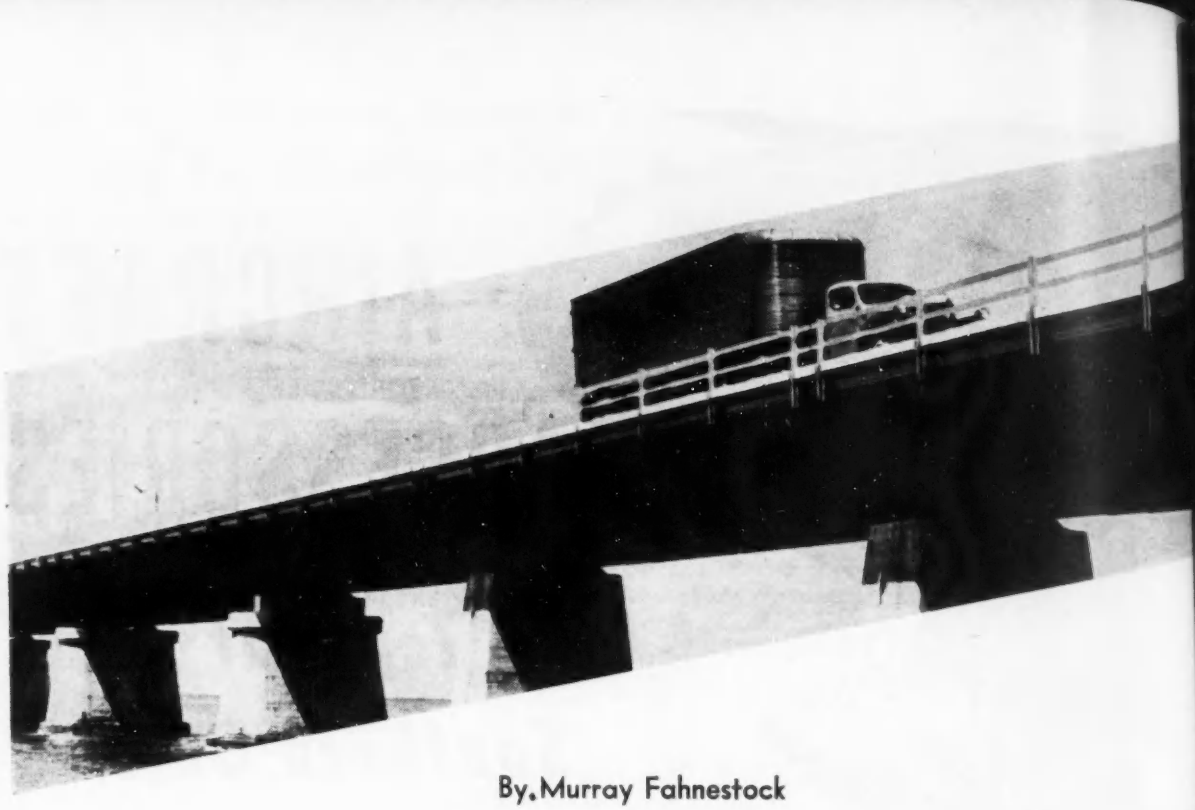
His paper, "Protection of Electrical Systems on Military Aircraft," compared the 1938 airplane to one of the present day. Prior to 1938, the electrical system in an airplane was patterned after that of an automobile. Today, a modern four-engine bomber requires 54 kw of power and 14 miles of cable. This change resulted from the application of electrical power to operate landing gear, flaps, instruments, radio, lighting, gun turrets, hearing equipment, radar, automatic pilots, turbo-supercharger controls, and other remote controls. Failure of the electrical system in the large airplanes of the future might result in the pilots' inability to control the flight of the airplane, he said.

Principal objective of electrical-system protection is to maintain a flow of power to all important power-consuming devices and to minimize or eliminate damage or fires resulting from electrical faults, the captain stated. He emphasized that improved electrical-system protection can be obtained without paying a weight penalty by the use of better application principles and improved electrical-system design. Capt. Lusk concluded his paper by saying that the additional cost of protection will be offset by the increased performance or availability of the airplane.

Ray G. Holt, Pesco Products Co., presented the second paper of the session. His paper, "Aircraft Accessories for 400-cycle Motor Operation," was not intended to discuss the relative merits and disadvantages of the hydraulic, d-c, or a-c systems, but rather to call attention to the features of design and performance which may be obtained by using a-c power. He said there has been a pronounced trend toward the use of three-phase, 400-cycle, 208-v power installation in the larger aircraft now in the experimental

cont. on p. 26

Chairman John F. Haines of Southern Ohio Section was ably assisted by his colleagues on the Governing Board in making the April 24 meeting a landmark in the Section's history. These include Vice-Chairmen Karl W. Stinson, Col. Clyde H. Mitchell, AAF, and Ervin A. Lauch of Columbus, Dayton, and Springfield, respectively; T. Robert Dinsmore, secretary-treasurer; Chairman W. H. Geddes, Meetings; George W. Heck, reception chairman, and Fred W. Heckert, publicity chairman



By Murray Fahnestock

"LESSONS of a War Economy" furnished the backdrop for Pittsburgh Section's stimulating Local War Emergency Transportation and Maintenance Meeting at the University Club on May 9. Well-attended sessions developed animated discussion, involving both controversy and new ideas.

Errol J. Gay, Ethyl Corp., fresh from a mission of transport investigation on the Far Eastern battlefronts, was the speaker at the evening dinner which topped off technical sessions held throughout the day. Mr. Gay gave startling figures of transport costs under war conditions in China and Burma – and showed colored pictures taken during his recent trip. The importance of pipe lines in transporting fuel in China is very great, Mr. Gay said. It used to cost $24 per gal to fly a gallon of gasoline into China, he pointed out, but the 4-in. pipe line now in operation (which has a capacity equal to that of 1800 trucks) has reduced that cost considerably.

SAE President James M. Crawford, speaking at the dinner, told the Pittsburgh engineers of SAE's vital contribution to successful prosecution of global war, recalling, incidentally, personal experiences as a cub engineer testing automobiles in the Pittsburgh hills. Organized SAE power has accomplished a major war job, Mr. Crawford said, and stressed the importance of continuing as effectively as possible in peacetime the cooperative engineering work of SAE technical committees. SAE Secretary and General Manager John A. C. Warner also spoke briefly at the dinner.

Spring Maintenance Analyzed

A little preventive maintenance probably could eliminate most current spring problems, Robert N. Austen, Iron City Spring Co., emphasized in his paper "Maintenance Engineering of Chassis Leaf Springs," at the morning session.

Preventive maintenance, he said, begins in the fleet superintendent's office. He urged that new vehicles be checked for loaded condition versus spring capacities before they are put into service, that the effect on springs of improperly adjusted brakes be explained to shop personnel, and that "spring maintenance be put on the inspection rack."

Complimenting spring manufacturers for a "thorough job," Mr. Austen pointed out that service breakages do occur, "so there must be some conditions creeping into operation that are beyond the normal figured by the designer."

Outlining a spring maintenance program, the author urged first that springs be checked to see if they have developed "fallen arches." If so, they should be replaced, or at least reset to the original height. The point where breakage occurs, he pointed out, usually indicates the cause of the fracture. For instance: Breakage at the center between the U-bolts usually is the result of loose U-bolts; breakage at the axle, but beyond the area clamped by the U-bolt, is caused by a sharp shearing edge of the axle seat or plate, or by improper gaging in the upper spring leaves; "wrap-up" of improperly adjusted brakes will break many springs; breaks at the base of the spring eye, or parallel to it, may come from any one of a variety of causes, and general breakage throughout the spring usually is simply a sign of inadequate capacity.

Discussion of Mr. Austen's points was led off by Warren A. Taussig, Burlington Transportation Co., who said that war-overloading of trucks has made fleet operators spring conscious to a greater degree than in any pre-war era. He urged incorporating into vehicle design some practical means of permitting axle realignment to prevent "dog-tracking," which he believes responsible [illegible] much tire wear. From 75 to 80% of [illegible] vehicles "dog-track" to some extent, [illegible] Taussig thinks, but indicated that if [illegible] effect is held within a 6-in. limit the [illegible] only are harmed. Wider "dog-tracking" may cause trouble with others on the [illegible]

Fred B. Lautzenhiser, International Harvester Co., disagreed with Mr. Austen's [illegible] that "compromises and assumptions in [illegible] original design are based on 'normal' operations and 'normal' conditions;" and also with the author's statement that "force exerted upon the corresponding wheel is within limit when one brake is out of adjustment and the entire braking force is thrown on one rear wheel." Because the axle housing is a reasonably rigid member, Mr. Lautzenhiser argued, each spring will take an equal share of the braking force regardless of point of application. To Mr. Austen's suggestions for preventive maintenance, Mr. Lautzenhiser added a suggestion of special attention to rebound clips.

Responding in discussion, Mr. Austen stated his belief that 5% tolerance in maintenance is justified – in addition to the probable 5% factory tolerance – assuming that the spring got its original set from the bottoming operation in manufacture.

Answering a criticism from Mr. Lautzenhiser that wrench manufacturers might react unfavorably to the suggestion for various length pipe extensions or wrench handles, Mr. Austen pointed out that wrenches already have been designed to permit use of extension handles after the nut has been run up with the short wrench.

Commenting on the relation of U-bolt tightness to spring breakage, Murray Fahnestock suggested that U-bolt tightness be checked to prevent center spring breakage by giving the U-bolts a sharp rap with a hammer, as railroad inspectors tap wheels to determine soundness. The Army, he said, uses large torque indicating wrenches as the preferred method of adjusting U-bolts. The Army agrees that trained mechanics [illegible]

USER PROBLEMS STRESSED

At Pittsburgh Section T&M Meeting

termine by "feel" when the bolt is under proper stretch if the threads are lubricated and in good condition at the time of reusing.

Richard Welker, Gulf Refining Co., urged the importance of spring lubrication, but warned that the type of lubricant and the method of application may have to be widely varied to achieve satisfactory results. Unlubricated springs, for example, usually are sprayed with a penetrating oil containing graphite, the oil being relied upon to carry the graphite between the leaves. Selection of a lubricant for covered springs, on the other hand, depends upon the vehicle manufacturer's recommendations, the method of application available, the surface finish of the spring leaves, and the amount of interleaf friction required by the particular design. Mr. Welker also urged greater cooperation between spring makers, vehicle manufacturers, and oil companies, on the problem of springs.

Synthetic Rubber Progress

Although the technology of synthetic rubber manufacture has made astounding progress, recent surveys indicate that operators must be even more careful in maintaining these tires, R. A. Blake, U. S. Rubber Co., told the afternoon session. Coast to coast reports from vehicle operators, he said, show that overall performance of synthetic truck tires ranges from a minimum of 40% to a maximum of 90% of rubber tires performance, with an average of about only 70%. His paper was on "Field Performance – Synthetic Tires."

Until laboratories and pilot plants have had more experience with these synthetic materials, truck operators were told, careful follow-through of tire maintenance must remain the order of the day.

In addition to the inherently shorter life of synthetics, tires today receive more abuse than formerly because they are mounted on older vehicles, streets and highways are in a general state of disrepair, driver personnel is not up to pre-war levels, and because rationing has made it difficult to match tires properly, the author said.

Tire maintenance must definitely control loads per tire, speeds, inflation, proper matching of duals, correct rim sizes, and caution in making repairs as soon as possible after damage to the carcass has been discovered.

Discussing Mr. Blake's paper, Mr. Taussig thought it preferable, on buses, to use tires which had sectional repairs on dual wheels, but agreed with Mr. Blake that since truck rear wheels carry heavy loads, it might be better to put repaired tires on trailers or on front wheels of trucks.

Joseph A. Harvey, Pittsburgh Motor Coach Co., said he does not use recaps on front wheels of buses and questioned the number of times it would be economical to recap synthetic tires. Mr. Blake suggested that tires be recapped as soon as the tread is worn smooth – because after that there is nothing to act as a guide to the thickness of remaining rubber. But if a sound carcass is used, a quality shop should be able to recap a tire so that it is the practical equivalent of a new one. Mr. Blake said he knows of synthetics recapped many times.

Mr. Blake said also that Pittsburgh operators get only about two-thirds of the mileage obtained in Detroit, due to topographical differences. Where pre-war passenger car fleets in Detroit were getting 18,000 miles comparable fleets in Pittsburgh were only able to obtain 12,000 miles.

SAE Vice-President Emil P. Gohn, Atlantic Refining Co., suggested balancing front wheel tires by the use of balancing cement to obtain better steering. He also explained that by taking tire pressures and temperatures at the beginning of a run and then measuring only the pressure at the end of the run, it is possible to calculate the temperature.

Heavy Duty Oils

Despite the vast amount of cooperative research and test work done by the engine manufacturers and petroleum refiners during the past quarter of a century, vehicle operators must rely on the recommendations of the engine builder and lubricant supplier in the use of heavy duty oils.

This was the conclusion of Dr. O. L. Brandes and H. H. Donaldson, Jr., Gulf Research & Development Co., in their review of "The Use and Valuation of Heavy Duty Oils." They pointed out that although the development of heavy duty oils has been an important achievement, such oils, fortified with additive agents, are not cure-alls for all engine troubles. Furthermore, they said, many civilian operations do not require these lubricants.

Vast amounts of test work have indicated that periods of oil change and other maintenance procedures cannot be enunciated in generalities. Again, the particular engine and type of service it performs are key factors. To date, the most important reason for conventional oil inspection tests is for the control of refining, checking on uniformity of the lubricants, for specifying certain properties, and for the identification of oils.

LOCAL WAR EMERGENCY MEETING

Pittsburgh Section's 16th Anniversary Meeting, May 9, was a rousing success due to the planning of Chairman S. G. Page; N. H. Werner, vice-chairman; D. G. Proudfoot, vice-chairman for Oil City; Secretary C. W. Butler; Treasurer Wallace Hallam, and Sessions Chairmen E. P. Gohn and R. J. S. Pigott. Mr. Page also presided at the evening session

Retires from Timken

T. V. Buckwalter

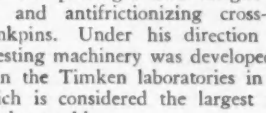
T. V. BUCKWALTER, who for the past 25 years has been chief engineer and vice-president of Timken Roller Bearing Co., recently retired under the company's retirement annuity plan, although he will still act in a consulting capacity. Much of Mr. Buckwalter's time was devoted to the promotion of Timken's railroad activity, as well as to the development of bearing applications for passenger and freight locomotives, and antifrictionizing cross-heads and crankpins. Under his direction large fatigue-testing machinery was developed and located in the Timken laboratories in Canton, which is considered the largest of its kind in the world.

Previously assistant chief engineer in the design section of Jacobs Aircraft Engine Co., Pottstown, Pa., **WILLIAM P. ROBINSON** is now project engineer in the Aircraft Engine Division, Packard Motor Car Co., Toledo, Ohio.

HARRY M. WILLIS has resigned his position of field service representative from Detroit with Wright Aeronautical Corp., Paterson, N. J. He now holds a similar position with Curtiss-Wright Propeller Division, Caldwell, N. J.

J. D. SULLIVAN was named vice-president of Colorado Fuel & Iron Corp. at a meeting of the board of directors in Denver early in April. He will continue in his present position as manager of commercial steel sales for the company, where he has been employed for the past seven years. Mr. Sullivan was chairman of the SAE Colorado Group for 1943-1944.

J. D. Sullivan



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CHARLES E. BURGESS, who was formerly vice-president and general manager, Luscombe Airplane Corp., Trenton, N. J., is now general superintendent of H & B American Machine Co., Pawtucket, R. I.

R. G. FROGNESS has recently been appointed chief engineer for the Pines Engineering Co., Inc., Aurora, Ill. He had formerly been chief checker, Batavia Metal Products, Inc., Batavia, Ill.

L. A. McDONELL, formerly superintendent of transportation, Dairymen's Association, Ltd., Honolulu, T. H., is now connected with the Honolulu Construction & Draying Co. as superintendent of equipment in charge of maintenance and repair of a large truck fleet. Mr. McDonell, who participated actively in forming the SAE Hawaiian Section, of which he is secretary, was a recent visitor at the SAE Headquarters in New York, where he discussed organizational plans for the Section and conferred with SAE officers about its functions.

L. A. McDonell

JAY M. ROTH, Thompson Products, Inc., has been appointed chairman of SAE Committee A-1 Aircraft Pumps, succeeding **DAVID GREGG,** chief research engineer, Eclipse Aviation Division, Bendix Aviation Corp. Mr. Gregg will remain a member of the Committee.

CLAIRE L. BARNES, founder and president of the Houdaille-Hershey Corp., has been elected chairman of the board of directors of Bendix Helicopter, Inc., to fill the vacancy created by the recent death of **VINCENT BENDIX,** a past-president of the Society.

Formerly president of Jesco Lubricant Co., North Kansas City, Mo., **JAMES A. EDWARDS** is now affiliated with the Macmillan Petroleum Corp., New York City, in the capacity of sales manager in the grease department.

JAMES B. KENDRICK, who had been aerodynamics engineer, Lockheed Aircraft Corp., Burbank, Calif., is now a research engineer at C.I.T.

Previously assistant chief engineer, Jacobs Aircraft Engine Co., Pottstown, Pa., **WALTER A. HURLEMAN** has been appointed chief engineer, V. L. Graf Co., Detroit.

WILLIAM T. GREEN has left Lockheed Aircraft Corp., Factory A, Burbank, Calif., where he was employed as flight test analyst, to become a representative for the Double Seal Ring Co., New York City.

Formerly research engineering assistant for United Air Lines, Inc., Chicago, **PALM E. PARKS** is now manager, William A. Green Co., New York City.

CHARLES T. STORK is no longer with the Machine & Tool Development Corp., New York City, where he had been general manager. He is now employed by Whipple & Rattray, consulting engineers, same city.

Formerly an SAE student member at Northwestern Technical Institute, **LaVERNE S. BROWN,** an ensign in the U. S. Navy, may now be reached c/o Fleet Post Office, San Francisco.

HUBBARD W. STEINER has severed his connection as plant manager of the Aetna Rubber Co., Cleveland, and has rejoined the U. S. Rubber Co., Detroit, where he now holds the position of chief engineer, railroad section, Mechanical Goods Division. Mr. Steiner is a former member of the Parts & Fittings Division of the SAE Standards Committee.

BRIG.-GEN. JOHN K. CHRISTMAS, deputy commanding general, U. S. Army, Office of the Chief of Ordnance, has been transferred from Detroit to Washington, D. C.

Formerly special project engineer, Fisher Tank Division, General Motors Corp., Detroit, **CHESTER L. CARLTON** is now chassis engineer, General Motors Corp., Product Study, Australian Operations, same city.

RALPH C. FLUGEL is professional and liaison engineer for Douglas Aircraft Co., Inc., Long Beach Division, Long Beach, Calif. Mr. Flugel also served in the same engineering group at the Tulsa and El Segundo divisions of the company.

JOHN W. ENELL, Wright Aeronautical Corp., Paterson, N. J., has been advanced from senior test engineer to assistant project engineer.

Formerly assistant machinery superintendent, U. S. Navy Yard, Philadelphia, Pa., **WILLIAM C. MORRIS,** a lieutenant in the U. S. Navy, may now be contacted c/o Fleet Post Office, San Francisco.

LT.-COL. WALTER C. THEE, who had formerly been attached to the Central Pacific Base Command, c/o Postmaster, San Francisco, may now be contacted c/o Ordnance Officer, Port of Embarkation, Seattle, Wash. Lt.-Col. Thee is a former member of the SAE T & M Activity Committee.

SAE Members

G. H. WOODARD, who is connected with Westinghouse Electric & Mfg. Co., has been transferred from the New Products Division

G. H. Woodard

in East Pittsburgh, Pa., where he was manager, to the Aviation Gas Turbine Division in Philadelphia, where he is serving in the same capacity.

JOHN W. ROGERS, who had formerly been chief engineer in the Honolulu branch of Continental Trailer & Equipment Co., is now engineer and manager of the Hilo, Hawaii, branch of the same company. Mr. Rogers has been active in forming the new SAE Hawaiian Section of which he is treasurer.

ROBERT SERGESON has been appointed chief metallurgical engineer of Rotary Electric Steel Co., Detroit, succeeding **L. L. FERRALL,** who has resigned. Mr. Sergeson had been connected with Crucible Steel Co. of America for the past seven years and prior to that time was with Republic Steel Corp. He is a former member of the Iron & Steel Division of the SAE.

Formerly superintendent, GMC Truck & Coach Division, General Motors Corp., Pontiac, Mich., **CARL L. HECKER** is now general works manager, ACF Brill Motors Co., Philadelphia, Pa.

M. A. THORNE has been transferred back to the central engineering department, General Motors Corp., Detroit, following his completion of an assignment as chief engineer in the original design department, Fisher Tank Division, GMC.

Previously chief inspector, Plant No. 2, Jacobs Aircraft Engine Co., Pottstown, Pa., **F. W. ROHDE** is now manager of the quality control department, Aviation Gas Turbine Division, Westinghouse Electric & Mfg. Co.

A. E. RHOADS is now executive vice-president and general manager of Kuhlman Electric Co., Bay City, Mich. He had formerly been manager of the Detroit Electric Furnace Division of the same company.

GORDON L. WOOD may now be reached at the Office o fthe Oil Controller, Ottawa, Canada. He was formerly district manager, Wholesale British-American Oil Co., Ltd., Toronto, Ont.

WALTER S. FORTNEY has been promoted from first lieutenant to captain in the U. S. Army and may be reached at A.P.O. 528, c/o Postmaster, New York City.

FRED NORTON, chief engineer, lubrication research department, Ohio Oil Co., has been transferred from the Findlay, Ohio, to the Robinson, Ill., branch of the company.

ARTHUR C. BUTLER has been appointed director of the National Highway Users Conference, Washington, D. C., according to an announcement by its chairman, **ALFRED P. SLOAN, JR.** Mr. Butler had been serving as manager of the Motor Truck Division of

Arthur C. Butler

the Automobile Manufacturers Association since 1932. Then, at the outbreak of the war, he was assigned to head the Military Vehicles Division of the Automotive Council for War Production, working closely with the Armed Forces in military vehicle and commercial production.

WARD M. ROBINSON has been appointed general manager of Talon, Inc., Meadville, Pa. He had formerly been vice-president of Robert Heller & Associates, Inc., Cleveland, Ohio.

Formerly chief engineering officer, Naval Landing Force Equipment Depot, Norfolk, Va., **LT. NORMAN E. CARLSON, USNR,** is now a special technical writer and is stationed at the Bureau of Ships, Navy Department, Washington, D. C.

A. J. LARRECQ is now the president of Associated Aeronautical Engineering & Research Corp., Trenton, N. J. Formerly, he was consulting engineer, Besler Corp., Oakland, Calif.

Previously laboratory technician, Cadillac Motor Car Division, General Motors Corp., Detroit, **EDWIN C. MAKI** is now an ensign in the U. S. Naval Reserve, Camden, Ark.

Elected President

Col. H. A. Toulmin, Jr.

COL. H. A. TOULMIN, JR., a member of Toulmin & Toulmin, lawyers of Dayton and Washington, D. C., has been elected president and chairman of the board of Hydraulic Press Mfg. Co., Mount Gilead, Ohio. Col. Toulmin recently completed a two and one-half year period of service with the U. S. Army, where he was assistant chief of transportation, Transportation Corps, building the Army's worldwide railroad program. He was recently awarded the Legion of Merit for having reached the highest level of industrial production in these fields in the history of the industry.

RAYDELLE JOSEPHSON is no longer associated with Sperry Gyroscope Co., Garden City, L. I., N. Y., as assistant patent attorney. She is now employed as specification writer with the patent law firm of Harris, Kiech, Foster & Harris in Los Angeles.

HARRY E. SMITH, formerly automotive aircraft adjuster, Fire Companies' Adjustment Bureau, Inc., Los Angeles, is now a business partner of Peerless Auto Salvage, same city.

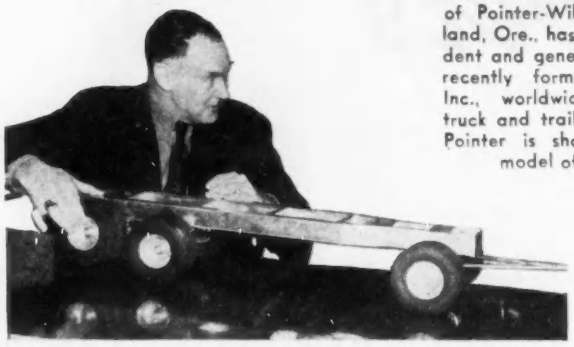
CARROLL J. WILSON has left the petroleum additive sales and research department of R. T. Vanderbilt Co., Inc., New York City, to join the Acheson Colloids Corp., Port Huron, Mich., as chemical engineer.

ADOLPH M. BACKSTROM, who had been installation machinist, Sun Shipbuilding Co., Chester, Pa., has become inspector for Douglas Aircraft Co., Inc., Santa Monica, Calif. Mr. Backstrom was formerly a first lieutenant in the Coastal Air Patrol.

HARRY BERNARD, previously general service manager, Mack Trucks, Inc., New York City, is now director of service and service engineering with headquarters in

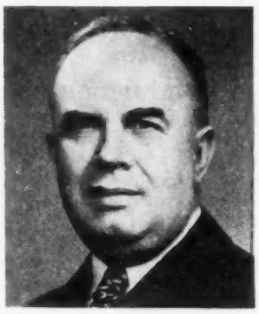
Harry Bernard

Long Island City. Mr. Bernard has been with the organization since 1924.



Robert W. Pointer (left), owner of Pointer-Willamette Co., Portland, Ore., has been named president and general manager of the recently formed Feather Ride, Inc., worldwide wholesalers of truck and trailer equipment. Mr. Pointer is shown with a scale-model of a full trailer

GEORGE M. SPROWLS, highway transportation manager, Goodyear Tire & Rubber Co., Akron, Ohio, recently received an honorary degree of doctor of science at Washington & Jefferson College's annual commencement exercises in Washington, Pa.



George M. Sprowls

Prominently identified with the Navy's survey of rubber since Pearl Harbor, and chief consultant on rubber for the Office of Defense Transportation, Mr. Sprowls has authored a number of technical papers and articles on tires and their maintenance.

CAPT. RUSSELL W. MEALS has been transferred from U. S. Army Ordnance School, Aberdeen Proving Ground, Md., to the Small Arms Division, the Pentagon, Washington, D. C.

Formerly technical director, Westland Aircraft, Ltd., Yeovil, Somerset, England, **WILLIAM E. W. PETTER** is now chief engineer in the Aircraft Division of the English Electric Co., Ltd., Preston, Lancaster, England.

E. J. NESBITT, who had been structural engineer, Sikorsky Aircraft Division, United Aircraft Corp., Bridgeport, Conn., is now a Sikorsky representative with the Nash-Kelvinator Corp., Detroit.

Formerly at Northwestern Technological Institute, **LAWRENCE G. PELZ** is now an apprentice seaman in the U. S. Naval Reserve and is stationed at Princeton University, N. J.

LEONARD EPSTEIN, who was a student at the Case School of Applied Science, is now a private in the U. S. Army and may be reached at Camp Blanding, Fla.

TURNER A. DUNCAN, who had formerly been field engineer, GMC Truck & Coach Division, General Motors Corp., Pontiac, Mich., may now be reached at the Scintilla Magneto Division of Bendix Aviation Corp., Sidney, N. Y.

CHESTER A. CLARK is now an electrical engineer, Office of the Chief of Engineers, U. S. Army, Washington, D. C. He had formerly been electrical designer for the same branch of the service, stationed at the Panama Canal, Balboa, Canal Zone.

Previously powerplant group engineer, Glenn L. Martin Co., Baltimore, Md., **JAMES D. ROBINSON, JR.,** has recently become affiliated with United Aircraft Service Corp., East Hartford, Conn., as a field installation engineer.

WILLIAM A. HAWKINS, JR. has recently been appointed head of the engine laboratory, Toledo Division, Packard Motor Car Co., Toledo, Ohio. He had formerly been project engineer with Continental Aviation & Engineering Corp., Detroit.

HARRY R. LEWIS, an aviator in the U. S. Naval Air Force, has been promoted from ensign to lieutenant. Formerly maintenance officer, Scouting Squadron 37, c/o Fleet Post Office, New York, Lt. Lewis may now be reached at Headquarters Squadron 5-2, Naval Air Station, Boca Chica, Fla.

Formerly general manager, Ecorse Division, Murray Corp. of America, Ecorse, Mich., **J. E. MALONEY** is now affiliated with the International Detrola Corp., Detroit.

ARTHUR W. BENHAM, JR., who had been field service engineer with Jacobs Aircraft Engine Co., Plant 1, Pottstown, Pa., is now connected with American Airlines, Inc., L. I., N. Y., in an engineering capacity.

Formerly chief metallurgist, Jacobs Aircraft Engine Co., Pottstown, Pa., **HERBERT J. NOBLE** has recently joined Pratt & Whitney Aircraft, Division of United Aircraft Corp., East Hartford, Conn., as engineering metallurgist.

WILBUR R. VESTER, a private in the U. S. Army, has been transferred from Headquarters Battalion, Camp Mackall, N. C., to Fort Benning, Ga.

H. C. AKERBERG, formerly Atlantic Coast district manager of Macmillan Petroleum Corp., has been appointed general sales manager of the company's Ring-Free Motor Oil Division, New York City.

H. C. Akerberg

HAROLD W. THOMAS has recently become engineering test pilot for Lockheed Aircraft Corp., Burbank, Calif. He was formerly chief experimental test pilot, Curtiss-Wright Corp., Airplane Division, Plant No. 2, Buffalo, N. Y.

Thompson Promotions

K. M. Bartlett (left), has been appointed director of research of Thompson Products, Inc., in which position he will be responsible for all metallurgical research, and will continue to handle his former duties as chief engineer of the main plant. T. R. Thoren (right), previously chief development engineer, has been named director of development, responsible for all development on new accessories

ALBERT A. PREVOST has recently been appointed to the engineering department of Mack Mfg. Corp., Allentown, Pa. He was formerly in the Research Division of the same company in Plainfield, N. J.

ROBERT A. COLE has been promoted from first lieutenant to captain in the Army Air Forces and has been transferred from Tonopah Army Air Field, Tonopah, Nev., to the equipment laboratory at Wright Field, Dayton, Ohio.

JOSEPH A. SCIORTINO, who is with the Army Air Forces Air Technical Service Command, Eastern Procurement District, New York City, is now chief procurement inspector stationed at Republic Aviation Corp., Farmingdale, L. I., N. Y.

CLARENCE L. GILLHAM, special representative, Willys-Overland Motors, Inc., formerly assigned to the Pacific Coast area since January, 1944, with headquarters in Los Angeles, has been transferred to the Southwest, with offices in Dallas, Tex.

Clarence L. Gillham

E. N. KLEMGARD, a lieutenant commander in the U. S. Navy, may be reached c/o Fleet Post Office, San Francisco. He was formerly officer in charge, petroleum inspection, 13th Naval District, Seattle, Wash. Mr. Klemgard is a former member of the Lubricants Division of the SAE.

ROBERT J. WOODS, noted aircraft designer, has been named special technical adviser to Lawrence D. Bell, president of Bell Aircraft Corp., Buffalo, N. Y. In addition to new duties concerning future aircraft development and production at Bell Aircraft Corp., Mr. Woods will also direct operations of the corporate Product Planning Group, a research organization set up several months ago to investigate new products in the aviation field.

MARTIN S. MANSSON has recently become affiliated with the Airol Engineering & Mfg. Co., Long Island City, N. Y. He was formerly chief draftsman, B. & G. Corp., New York City.

Formerly at Camp Elliott, San Diego, Calif., R. M. VAN EE, chief motor machinists' mate in the U. S. Navy, may now be reached c/o Fleet Post Office, San Francisco.

Formerly general manager of supplies and transportation for the petroleum industry, War Council, District 1, New York City, RUD J. BABOR is now affiliated with the Richfield Oil Corp., same city.

J. W. MILLER, formerly an aviation cadet in the U. S. Naval Air Corps, is now an ensign and may be reached at Kliberg Station, Corpus Christi, Tex.

Awarded Degree

In ceremonies held at Case School of Applied Science, President William E. Wickenden (left), presented to Glenn L. Martin, president of the aircraft organization bearing his name, the honorary degree of doctor of engineering. At the right is Carl F. Prutton, head of the department of chemistry at the school

CHARLES W. MILLS, JR., a major in the U. S. Army, has been transferred from Stockton Ordnance Depot, Stockton, Calif., to Benecia Arsenal, Benecia, Calif.

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OBITUARIES

Charles P. Sander

Charles P. Sander, assistant chief engineer of Ranger Aircraft Engines, Division Fairchild Engine & Airplane Corp., Farmingdale, L. I., died recently after a brief illness at the age of 41.

Mr. Sander, who received his B. S. degree from the University of California in 1925, had a number of patents issued to him, among them several covering cylinders, valve mechanisms, and propeller reduction gears. Joining the Ranger organization in 1942, Mr. Sander contributed to administrative growth as well as technical development at the company. He formerly was chief engineer for Menasco Mfg. Co., where he helped to develop the Unit-Twin – two engines driving a single propeller shaft.

A native of Anaconda, Mont., Mr. Sander had been a member of the Society since 1940.

Anton F. Brotz, Sr.

Anton F. Brotz, Sr., director of research of the Kohler Co., Kohler, Wis., died April 13 at the age of 69 following a short illness. Four years after he started his engineering career in 1894, Mr. Brotz came to the Kohler Co., where he remained until his death. Starting as steam engineer, he became successively, mechanical engineer and research engineer with the company. His leisure time was devoted to his two hobbies, motor mechanics and aviation. In the early stages of aviation, he experimented with gliders, and in 1902, he built an automobile in his spare moments which he called the "Brotz Special."

Thomas A. Watson

Thomas A. Watson, assistant professor of mechanical arts, U. C. L. A., died April 22 of a heart attack. Prof. Watson was 52 years old.

A native of Glasgow, Scotland, Prof. Watson came to the United States in 1914 and later attended U. C. L. A. as a special student in engineering. He enlisted in World War I and was in charge of motor transport in the 90th Infantry Division, overseas. Working as a die designer and later as a consulting automotive engineer, Prof. Watson, with a group of specialists from the airplane industry, gained the engineering background needed to start a special training course for people working in non-essential industries who wanted to contribute to vital production in war plants.

Prof. Watson, an SAE member since 1926, was actively engaged in Northern California Section affairs.

Lt. Arthur D. Duchow

Lt. Arthur D. Duchow, an officer in the U. S. Army Infantry, was killed in action while serving on Leyte Dec. 1. Lt. Duchow was 25 years old.

In April, 1943, he was appointed maintenance officer in charge of the supervision of regimental equipment at Fort Ord, Calif. After studying at Sacramento Junior College Technical Institute of Aeronautics for a year and a half, he attended Infantry School at Fort Benning, Ga., taking the Officers' Motor Maintenance Course.

Lt. Duchow was elected a junior member of the Society in August, 1943.

Alfred C. Torgerson

Alfred C. Torgerson, 52, died on Nov. 9. As general manager of Torgerson Bros. Co., Mr. Torgerson had charge of all automotive work of the company, including sales and service, upholstering, trimming, and Duco refinishing. He was also connected with Intermountain Transportation Co., where he had designed and built passenger buses.

Although he was born in Norway, Mr. Torgerson was educated at Old Trafford Technical School, Manchester, England. He had been a member of the Society since 1925.

Southern Ohio

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stage. This is largely due to the low weight of wiring required, a saving in weight in the motor, elimination of commutators and brushes, and simplicity and safety of the installation, he pointed out.

In discussing fuel pumps, the author commented that it was possible to eliminate two serious problems associated with d-c pumps by operating the a-c motor in the gasoline. It became possible to change the bearings for the armature shaft from ball bearings to plain bearings and to eliminate seals between the pump and motor. He stated that tests indicated that the fluid friction in this type of installation is slightly less than the torque friction of a standard seal for a d-c fuel pump.

Mr. Holt concluded his paper by commenting that possibly the most outstanding contribution in the way of 400-cycle powered accessories has been in the development of the "power package." These "power packages" are a complete hydraulic system in themselves including an oil reservoir, reversible electric motor, pressure-loaded gear pump, relief valves, and other control valves. The smaller unit uses a 4-hp motor and weighs 14½ lb, the larger unit uses a 12-hp motor and weighs 23 lb.

Arthur Nutt, director of aircraft engineering, Packard Motor Car Co., was the chairman for the afternoon session on aircraft engines. Lowell M. Edwards, consultant on pumps with Thompson Products, Inc., presented his paper, "Performance of the Air-Oil Separator in Engine-Breather Systems." Mr. Edwards stated that the interest in the air-oil separator has increased as the dilution take-off requirements have become more severe. Under combat conditions, aircraft engines must be brought up to take-off power without a warm-up period. If the engine oil had been diluted by gasoline for cold-weather starting, the loss of lubricating oil through the breather could be as high as 10 gpm. By designing a power-driven centrifugal oil trap, the effluent from the engine crankcase can be separated into oil which is returned to the engine under pressure and vapor which is discharged from the engine.

The speaker described the laboratory set-up used in testing the air-oil separator. Test results proved that the air-oil separator can reclaim 10.2 gal of oil per min while losing only 0.00034 gpm. A movie was then shown to illustrate the effectiveness of the air-oil separator. Mr. Edwards concluded by stating that the use of the air-oil separator can be continued in the accessory form or by adapting it as an integral part of the engine.

John M. Tyler, installation consulting engineer, Pratt & Whitney Aircraft, presented the final paper of the afternoon sessions, entitled "Aircraft Powerplant Vibration Problems." He pointed out that aircraft engines cause all vibrations except those caused by turbulence about a propeller, engine-airplane, and aerodynamic vibrations. The problems arising from these vibrations must be solved by analyzing records from electrical pick-ups.

In discussing the noise level caused by the propeller, the engine exhaust, and cabin vibrations, the author said that it has been noticed that the noise level affects an observer's reaction to the vibration level. For a production acceptance check on airplanes, it is necessary to use an instrument which has been calibrated and marked by a red line to indicate maximum permissible vibration at the stick, pedal, longeron, or other critical structural member. In the case of structural failures, it is necessary to make a more complete survey throughout the operating range. Mr. Tyler then showed slides illustrating the different types of electrical pick-up, recording, and analyzing equipment developed to reduce the time necessary to solve these vibration problems. He stated that there is a trend toward fixed engine mounts, but advised that the design be made adaptable to flexible engine mounts as it is impossible to predict vibrations of the completed airplane.

John F. Haines, chairman of the Southern Ohio Section, opened the dinner session by welcoming the speakers, members, and guests to this aeronautical meeting. John A. C. Warner, secretary and general manager of the SAE, introduced SAE President James M. Crawford, who cited the General Motors Research Laboratories Division and Wright Field as examples of research organizations which are a benefit to industry. He emphasized the need for good men in research organizations in order to establish a post-war future for returning service men.

Lester Steffens, petroleum research engineer, Socony-Vacuum Oil Co., Inc., discussed aviation gasoline in his paper "Mechanics of the Manufacture of Aviation Gasoline." He said the oil industry has made 500,000 bbl of 100-octane gasoline per day, and has been able to constantly increase the quality. He quoted figures showing that prior to 1941, the oil industry was producing ½ gal of 100-octane fuel from every 42 gal of crude, and now the refineries are producing 6 gal of that grade from every 42 gal of crude oil.

The speaker compared the problem of refining 100-octane fuel to that of manufacturing a small part. The raw stock for this part must be selected for "size" and "shape." Some "machining" is necessary to reduce larger stock to the required dimensions and "welding" might be used to build up smaller "pieces." In the oil industry, distillation is used to separate the hydrocarbons in the crude oil, cracking performs the same task as machining, and synthesis combines the smaller hydrocarbons into a usable product. The proper mixture of all these products produces a gasoline which has antiknock quality, freedom from impurities, high power output and economy.

Mr. Steffens pointed out that the increased quality of the fuel has reduced the output limitations on engines by permitting increased compression ratios, more advanced spark position, and higher supercharging. He stated that the oil industry will continue to search for newer fuels and better production methods.

The display of captured axis aircraft accessories, which was placed at our disposal by the Air Technical Service Command, attracted considerable attention.

Student Branch News

MEMBERS of the *General Motors Institute SAE Student Branch* examined methods of precision balancing at meetings on March 21 and April 18. K. E. Sihvonen gave an illustrated description of the development of balancing equipment. Mr. Sihvonen demonstrated the use of modern balancing equipment, including the extremely sensitive device used for balancing high-speed rotors. This unit makes use of the piezo-electric principles, wherein deflections caused by unbalance in the part are impressed upon a crystal pick-up which causes measurable voltage to be created. The most sensitive of this newly-developed equipment, it was declared, would recognize unbalance caused by oily fingerprints on a three-in. diameter.

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Students at the Massachusetts Institute of Technology resumed activity of the *M. I. T. SAE Student Branch* at a reorganization meeting held March 16. Harvey S. Freeman was elected chairman; Russell K. Dostal, vice-chairman; Herbert W. Oedel, secretary-treasurer and Alan R. Gruber, field editor. Members of the Student Branch attended the April 2 meeting of the New England Section to hear SAE President James M. Crawford deliver a paper entitled "Automotive Decision."

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At the April 5 meeting of the *California Institute of Technology SAE Student Branch*, Harold L. Pierce presented a paper on the status of the California oil industry. Pointing out that California oil production is on the decline, he indicated the need for better methods in oil surveying, and suggested the possible future use of radar for this purpose. Mr. Pierce declared that repressurizing of oil fields is an important technique for the conservation of the nation's oil supply.

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The *SAE Club of the Detroit Institute of Technology* held its annual dinner meeting in Windsor, Ont., on April 26. Harry Gotberg, chief engineer, Colonial Broach Co., presented a paper entitled, "Broaches, Their Design and Application." Mr. Gotberg described the history and development of the broach and illustrated the many applications of the modern broach.

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The newly formed *University of Colorado SAE Club* met April 17 for an informal address by Hollister Moore, SAE Staff Representative, Student Activities. In the evening members of the Club joined members of the SAE Colorado Group in a trip through the local Kaiser plant, where they observed the manufacture of eight inch and 155 mm shells.

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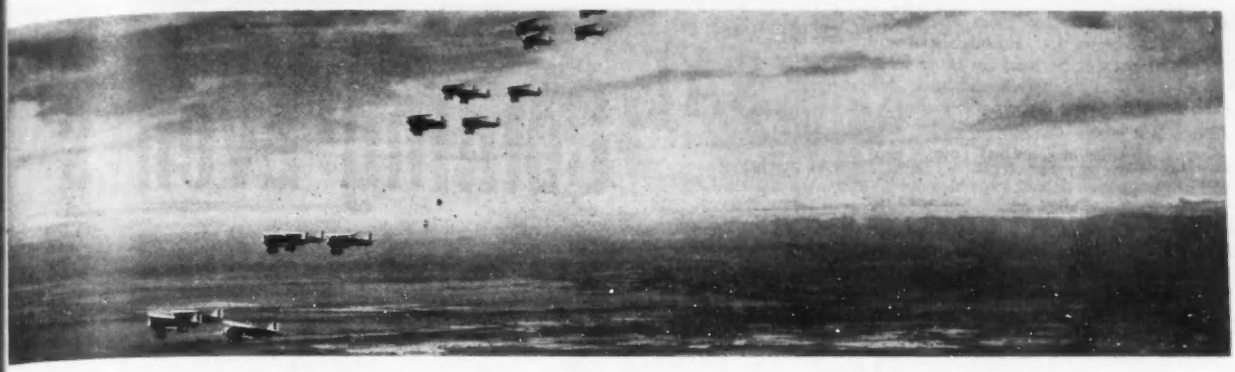
F. P. Grutzner, Fairbanks, Morse, & Co., was guest speaker at the April 4 meeting of the *SAE Student Branch of the University of Wisconsin*. Mr. Grutzner traced the early development of the diesel engine, and gave his personal recollections of Rudolf Diesel.



Helicopters... Production... and Engines...

LOCAL WAR · EMERGENCY · S A E · MEETING

SHARE STAGE at Buffalo Aero Meeting

By Mark J. Henehan

AIRCRAFT riveting versus spotwelding, and development of helicopters were the major topics of discussion at the War Emergency Meeting of SAE's Buffalo Section, held in Hotel Statler, May 1. More than 150 members and guests attended the interesting and highly informative session.

First speaker at the afternoon session was J. W. Cunningham, Wright Aeronautical Corp. His treatment of the subject "High-Conductivity Cooling Fins For Aircraft Engines" stimulated numerous questions from aircraft engineers after he concluded. Pointing out that the per cent of total heat generated in a cylinder which is rejected to the cooling fins tends to be constant, the author said the need for more efficient cooling to permit operation in a wider temperature range is apparent. He then outlined Wright's program for determining ways and means of applying copper or aluminum to cylinder barrels.

Another question-provoking discourse was provided by Marcel Piry, Ranger Aircraft Engines, whose paper "Single-Cylinder Engine High-Altitude Cooling Tests," made a concise analysis of the many factors involved and described a single-cylinder engine test aimed at the measurement of actual values of the pressure drops required for satisfactory cooling from sea level to 30,000 ft altitude. Discussion centered around the results obtained and the best methods of conducting tests of this nature.

First real "fireworks" insofar as discussion was concerned during the session, was touched off by the next two speakers: H. A. Mullen whose subject was "Aircraft Spotwelding at Willow Run," and F. J. Dietrich who delivered a paper on "Aircraft Riveting and Equipment."

Spotwelding Progress Marked

According to Mr. Mullen, the progress made in aircraft spotwelding has been so marked in recent years, that the industry today is seriously discussing 100% spotwelded aircraft. At the Ford Willow Run plant where B-24 bombers are produced, on the basis of 313,237 rivets, the present ratio is 5 to 1 spotweld and this ratio is continually being reduced. In round numbers, Mr. Mullen pointed out, 100 assemblies have been converted from riveting to spotwelding, representing 60,000 spotwelds. This effected a saving of 125 man-hours per ship and not only a corresponding reduction in weight, but also a share in reducing the cost, which is now about only one-half of original estimates. Mr. Mullen said such success in the Ford plant could be attributed to the general cooperation of all personnel involved and a rigid control over quality requirements.

Success of the Buffalo Section Aeronautical Meeting, May 1, was largely due to Section Chairman F. L. Koethen, and his aides, including E. C. Horton, secretary-treasurer; O. A. Hansen, chairman of the Program Committee and Session Chairmen L. P. Saunders, G. A. Page, Jr., and John G. Lee

Riveting Favored

Taking the opposite view, Mr. Dietrich admitted that many attempts have been made in recent years to eliminate the rivet partially or wholly in aircraft assemblies. Prime attempts have been centered about the rapid developments in fusion welding, spotwelding, and adhesives. However, these attempts have failed because of the rivet's capacity for simple installation in the field as well as the shop, on both metals and non-metallic materials, or their combinations, regardless of their geometry or bulk.

A split second after Mr. Dietrich had finished, the rivet versus spotweld forces ranged themselves for discussion of a subject as frequently argued as Dempsey's "long count" battle. T. H. Sepller led off the debate, followed by C. Wesley Steward, John G. Lee, Morton Barbe, George E. Otter, and R. L. Morrison. The latter two, of Fleet Aircraft Ltd., gave an interesting description

of present English spotwelding methods, expressing the belief that, although spotwelding cannot at present be used on large jobs because of certain inherent difficulties, these difficulties are rapidly being overcome.

Thrills in Combat Tale

The prolonged debate proved a good appetizer for the dinner which followed. Presided over by genial Fred Koethen of Goetz Petro-Chemical Co. and chairman of the Buffalo Section, the banquet might have been a period of complete relaxation. But it wasn't. And the coffee speaker, William J. Crosswell, Curtiss-Wright Corp., was responsible. Giving an eye-witness account of "An Attack with Task Force 58," the speaker had his listeners on the edges of their chairs for more than an hour as he related his exciting experiences.

Material Selection Important

"Structural Model Testing" was the subject of a paper delivered by O. W. Loudenslager, Goodyear Aircraft Corp., in the opening evening session. He traced the development of models for the purpose of studying the stress and stability characteristics of indeterminate structures. While the methods described by Mr. Loudenslager were used for rigid airship structures investigations, he said that in his opinion, the same methods might well be applied to other types of structures. Placing strong emphasis on the material selected for stress models, he pointed out metals proved most satisfactory because of their resistance to aging and humidity.

2-Engine Helicopters Seen

Declaring that helicopters of the future could be built for almost limitless loads, W. Laurence LePage, Platt-LePage Aircraft Co., the final speaker of the session, traced the many stages involved in the development of the helicopter, designed by his company. At the outset of his talk, the energetic and dynamic engineer told the group that he would be as frank as possible in his remarks "inasmuch as I am in Bell helicopter territory, and many are here who are as vitally concerned about the future of helicopters as I am." Declaring that a bright future is assured, Mr. LePage envisioned twin-engined fourteen-passenger commercial helicopters with a speed of 150 mph. Altitudes may range up to 20,000 ft, he predicted. After many questions from the floor were answered, Arthur M. Young, designer of Bell Aircraft's helicopter, and Mr. LePage "went into a huddle" and soon attracted a large group for further informal debate.

In charge of arrangements for this successful meeting were the following Buffalo Section members: Section Chairman Koethen, Erwin C. Horton, Trico Products Corp.; O. Arnold Hansen, Linde Air Products Co.; E. V. Schall, Trico Products Corp.; Humphrey F. Parker, Columbus-McKinnon Chain Corp.; L. J. Clapsadle, Linde Air Products Co.; Lawrence P. Saunders, Harrison Radiator Division, General Motors Corp.; George A. Page, Jr., Curtiss-Wright Corp.; Robert J. Wolf, Bell Aircraft Corp.; Paul E. Hovgard, Fred Flader, and Charles E. Hathorn, Curtiss-Wright Corp.; and G. "Jerry" Magrum, Houde Engineering Division, Houdaille-Hershey Corp.

Chairmen for the afternoon and evening sessions respectively were Mr. Page, Mr. Saunders, and John G. Lee.

SAE Coming Events

Cleveland – June 8

Annual Golf Outing.

Detroit – June 4

Book-Cadillac Hotel; Silicones – Their Engineering Aspects and Fields of Application – W. T. Eveleth, General Electric Co. Electron Microscopic Investigation of Surface Structures – Dr. R. D. Heidenreich, Physics Division, Dow Chemical Co. Observations on Military Transport Vehicle Operation in Europe – Lt.-Col. E. H. Holtzkemper, chief, Transport Vehicle Branch, OCO-Detroit. Rubber at War – Major J. J. Robson, Rubber Branch, OCO-Detroit. Ordnance Automotive Activities in the Southwest Pacific Theater – Major A. E. Cleveland, OCO-Detroit. Dinner 6:30 p.m.; Toastmaster – Clarence W. Avery. Coffee Speaker – Mayor Edward Jeffries, president, Murray Corp. of America – Subject to be announced. Wartime Developments in Automotive Engineering – C. L. McCuen, vice-president, General Motors Corp. Motion Pictures. Education Project and Body Standards Reports – W. T. Fishleigh. (SAE President J. M. Crawford will preside at the Semi-Annual Business Session of the Society which will be held during the evening session.)

Metropolitan – June 14

Pennsylvania Hotel, New York; meeting 8:00 p.m. Economies of Aircraft Maintenance – Reagan C. Stunkel, general service manager, Lockheed Aircraft. Discussers: Charles Froesch, Eastern Air Lines, Inc. W. C. Mentzer, United Air Lines, Inc. J. G. Borger, Pan American Airways, Inc.

Kansas City – June 7

Continental Hotel; The Design of Electro-Mechanical Actuating Systems – H. Adams and Fred Foulon, Douglas Aircraft Co., Inc. Future Aircraft Electrical Loads – Austin F. Trumbull, United Airlines Representative, Douglas Aircraft Co., Inc. Auxiliary Power Systems for Aircraft – M. M. Berry, Dennis DeCourcey, Karl Martinez and Sidney Schnitzer, Boeing Aircraft Co. Application of T-Category Licensing Test Information to Airline Operation – R. C. Loomis, Transcontinental and Western Air, Inc. Package Heating Systems – H. R. Porter, Transcontinental and Western Air, Inc. Chairman – Com. A. F. Bonnalie. Symposium – Indoctrination of Airline Personnel to New Equipment. Training of Personnel for the Operation of Mars Aircraft – Capt. C. H. Schildhauer, USNR. Mobile Training Units – We Have to Train our Personnel on the Job – Lt.-Col. N. K. Warner, chief, Training Division, Operations, Army Air Corps, presenting paper prepared by H. B. Fisher, Technical Adviser, Mechanic and Engineer Training Operations, Air Transport Command. An Analysis of the Fundamental Training Problems Created within an Airline by a Transition from Two-Engine to Four-Engine Equipment – Daniel B. Woodyatt and Arthur W. Jerrems, United Air Lines. W. B. Lester, American Airlines, Inc. Title to be announced. R. C. Stunkel, Lockheed Aircraft Corp. Title to be announced.

New England – June 29

Weldon Hotel, Greenfield; dinner 6:30 p.m. New England Section Outing.

Northwest – June 1

Gowman Hotel, Seattle; dinner 7:00 p.m. Brakes Service and Maintenance – Tom McDermott, service engineer, American Brakeblok Division, American Brake Shoe & Foundry Co.

Peoria – June 11

Jefferson Hotel; dinner 6:30 p.m. Some Aspects of Licensing of Engineers – R. D. Henderson, engineer, Research Department, Caterpillar Tractor Co. Diesel Cold-Starting – E. J. H. Bentz, laboratory engineer, Caterpillar Tractor Co. Casting Design – Richard S. Frank, Caterpillar Tractor Co.

Northern California – June 12

Engineers Club, San Francisco; dinner 7:00 p.m. Transportation and Maintenance Meeting. Speaker to be announced.

Southern California – June 7

Ambassador Hotel, Los Angeles; meeting 8:00 p.m. Tractor and Power Meeting. Speaker – E. R. Rutenber, installation engineer, Waukesha Motor Co. Subject to be announced.

Spokane Group – June 8

Spokane Hotel; dinner 7:00 p.m. Safety in Fleet Operation – L. P. Johnson, Colyear Motor Sales Co.

Western Michigan – June 15

Occidental Hotel, Muskegon; A Correlation of Stress Concentration with the Fatigue Strength of Engine Components – Charles Gadd, Research Laboratories Division, General Motors Corp. Materials of Bomber Construction – A. B. Richards, Ford Motor Co. Induction Hardening – Applications, Method and Practical Results – F. F. Vaughn, assistant chief metallurgist, Caterpillar Tractor Co.

LIGHT AIRPLANE SYMPOSIUM

Marks New SAE Interests as Part of Detroit Aeronautic Meeting

By W. F. Sherman

ALL of the excitement of V-E Day rumors was added to the agenda of the Local War Emergency Aeronautic Meeting of the Detroit Section on May 7.

Despite the distractions of such world-shattering news scoops as the surrender of Germany, members turned out in substantial numbers for each of the four sessions in the Horace H. Rackham Educational Memorial Building. Several hundred attended the early sessions, nearly 400 attended the dinner, and 700 were at the evening program to hear SAE President J. M. Crawford, outline the problems and objectives of the Society.

Gears, bearings and supercharger development highlighted the morning sessions, the post-war light airplane was held in focus for an afternoon symposium, and the technical sessions were topped off by a coffee talk on helicopter construction developments.

Precision gears have proved to be among the major design and production problems in the wartime aircraft engine program. Probably typical of the development history of such gears is the example cited by Forest R. McFarland, Packard Motor Car Co. research engineer, who stated that during the past ten years the horsepower delivered by the Rolls-Royce "Merlin" has been substantially doubled, and the highly loaded gears in this engine have been developed to transmit this increased power without any appreciable increase in size or weight.

He said that scuffing of reduction gear teeth had been found to be a principal problem and he attributed the scuffing to lack of proper profile on teeth, improper mounting of gears, lack of parallelism of teeth, lack of proper surface finish and improper lubrication. Any one of the items may cause scuffing, but it is usually the result of two or more items being out of limits, he said.

Following discussion of design, finishing methods and inspection, he stated that the provision of increased clearance or "net relief" had improved the profile; that new aligning and mounting practices improved bearing across the teeth, and that change in processing eliminated distortion that had occurred in carburizing, so the gears and gear assemblies were much improved as production got under way on the Rolls-Royce.

It was learned, he said, that more coarsely dressed grinding wheels, giving profilometer readings of 15 to 37 micro in. rms, provided gears which will go through a model test without even wearing through the grinding marks. Improved lubrication at the start of acceptance runs brought definite improvements in gear performance, he added.

The impetus given to the use of silver bearings was described by R. B. Etchells and A. F. Underwood, of General Motors Research Laboratories Division. Increased service life has resulted without any other particular design changes, they said. Extensive tests with cast silver, electro-deposited silver and thermal bonding were described. The authors provided ratings of fatigue resistance, score resistance, embeddability and corrosion resistance for copper-lead, silver, silver grid, copper grid, cadmium-silver, lead-base

babbit, tin-base babbitt and aluminum alloy bearings. They have made use of an unusual plotting method to give a quick evaluation of the rating of each type of bearing mentioned above, for each of the four important factors, and concluded that the silver grid bearing offers the greatest possibilities.

Factors affecting the performance of silver bearings were described to show that silver should be as pure as possible; for resistance to fatigue, there must be a good bond between the silver and the bearing backing; and that it is preferable to heat-treat silver bearings in a hydrogen rich atmosphere.

Axial Supercharger Preferred

The virtues of axial and centrifugal superchargers were given searching review in two papers, one by W. J. King, of General Electric Co., and the other by Kenneth Campbell, research engineer, and John E. Talbert, project engineer, Wright Aeronautical Corp. The authors concurred in the viewpoint that the axial type of supercharger or compressor is currently in the ascendant. Mr. King predicted that the continuing trend toward higher critical altitude will provide further incentive to exploit the relatively high volumetric capacity of the axial design. The Campbell-Talbert conclusion is based on the probable use of the axial type where compressor efficiency above 80% is at a very high premium.

Service problems and operating costs of personal airplanes held the attention of the audience when R. D. Hicks, Continental Motors Corp., and John W. Friedlander, Aeronca Aircraft Corp., presented their papers. The post-war market for such planes and a resume of desirable characteristics were subjects of the two other papers at this symposium of the afternoon session by Ray Robinson, Crowell-Collier Publishing Co., and Raymond B. Maloy, CAA, respectively.

The three principal manufacturers of light aircraft engines, Continental, Franklin, and Lycoming, had some of their viewpoints embodied in the discussion by Mr. Hicks. He classified operator-abuse of the engines as being one of the most important contributing factors to failures and complaints. Inadequate mechanical margin was a close second. Workmanship, both on new engines and in overhaul shops, was the third factor. He said that efforts are being made to reduce cost of engine maintenance, even though it is only a fraction of the present overall cost of maintaining and operating a small airplane. A pilot, he declared, will view an engine failure from the standpoint of (1) how dangerous is it? (2) what will it cost to fix? and (3) how long will it take to effect repairs? Mr. Hicks placed safety as being uppermost in the minds of all concerned, although dangerous types of failures have been almost completely unknown for the past five years. He stated that cost problems can be improved through reduction in the number of failures and also through lessening of wear. As to the third question, he said that engineers and service departments recognize its importance to owner satisfaction, and are collaborating to reduce both the frequency and the duration of "time out." His paper drew upon the knowledge gained by wartime service experience to offer suggestions that will lower costs.

An extensive statistical investigation of airplane operating cost factors was offered by Mr. Friedlander. He said that small variations of horsepower, speed and list price make little difference in the cost-per-mile traveled, if the airplane is used to its full utility, mainly between 200 and 300 hr per year. The task of the industry is to design, manufacture and sell airplanes having the utmost utility for the private owner. This will hold the total operating cost of the typical small airplane at about the range of five to six cents per mile, he indicated. Things that will increase utility of the airplane include a nationwide series of airparks, landing strips and other facilities, he said.

As this program gets under way, Mr. Friedlander remarked, it will be exactly the same type which started when good roads forced the building of good highways which in turn created, in a large measure, the automobile industry as we know it today.

As soon as travel by personal aircraft becomes commonplace, he declared, the question under discussion will become entirely academic – because the pleasure, the saving of time, the comfort and the ease of personal aircraft transportation will remove from everyone's mind the query of what it costs to operate an airplane.

Analysis of the potential market for light planes has revealed that only 10% of the individuals questioned in the Crowell-Collier survey are planning to buy an airplane after the war. But only about 3% of the sample "could be called 'hot' prospects," Mr. Robinson stated. Since this sample covered only urban families of average or better income he said that the figures can be projected to show an indicated desire for between 100,000 and 300,000 personal planes. Contrasting with these conservative figures, he pointed out, is the fact that the survey showed that about 38% of the individuals have at least some lukewarm desire for future ownership of airplanes.

Airplanes to Be Driven

In the future it is going to be necessary to design airplanes that can be "driven" in the air, in the sense that the number of controls, their type and use, and direction and sense of motion must follow a pattern with which the general public is not too unfamiliar, according to Mr. Maloy, who is technical assistant to the director of safety regulations for CAA.

Basing his statements principally upon accident and performance records, he said the first item in any specification must be a rigid definition of the stall and spin characteristics. He pointed out that rigid stall requirements should be required but that the airplane need not be actually non-spinnable, although manufacturers who desire to build non-spinnable aircraft are entitled to have their product listed as such.

An adequate rate of climb is definitely related to the number of stalling accidents and an increase in the required minimum climb was advocated.

Necessity for protection from propeller accidents in the family-type airplane might even require the installation of a ring around the propeller which would, if anything, increase the efficiency of the propeller unit, he said. When consideration is given to the four- or five-place family airplane, it is considered essential that the aircraft be designed for full gas and oil, all seats occupied by 170-lb passengers and all baggage compartments full, without exceeding the allowable gross weight or center of gravity limits. Possibly there is need for an automatic indicating system which would accurately inform the pilot of the gross weight and c. g. location of the airplane on the ground prior to take-off, he said.

Problems encountered in fabricating the helicopter were discussed briefly at the dinner by Thomas Harriman, of Bell Aircraft Co. and A. P. Young, who was awarded the Order of the British Empire after World War I for his services in the field of electrical ignition, discussed the engineer and his relation to human progress. Mr. Young is a noted industrial manager and educator besides being recognized as an important electrical engineer and inventor.

The diversity of interest of members of the Society provided the backdrop against which President Crawford presented his very intimate discussion of the role which the Society plays in the engineer's professional life. Two major problems before the Society during the past year have dealt with the member's personal interest in a type of organization SAE should be (covered by the lead article in the April issue of the *SAE Journal*) and with the re-organization plan for post-war SAE Technical Committee activities, which is being submitted to the membership in the June issue of the *Journal*, he said.

"The advantage of having a fully informed membership, where so many activities are involved, is obvious," Mr. Crawford said. He closed his address with the expressed hope that "as an engineering society composed of professional activities with widely divergent interests, we can weld these groups together for a better technical result."

Detroit Section Chairman R. N. DuBois was assisted by a group of experienced meetings planners in preparing for the all-day May 7 Aeronautic Meeting. Among those responsible with him for the success of the meeting were E. M. Schultheis, meetings chairman and secretary; Treasurer F. W. Marschner; vice-chairman R. J. Waterbury; D. M. Borden and Dr. F. D. Knoblock, vice-chairman and assistant vice-chairman for Aeronautics; Robert Insley, entertainment chairman; Chairman Fred Dietz of Meetings Operations; E. F. Petsch, reception chairman, and Sessions Chairmen Carl Bachle and Peter Altman

News..

..OF THE SOCIETY

W.E.B. Lays Industry Program Basis for Mechanical Driving Aids for Wounded

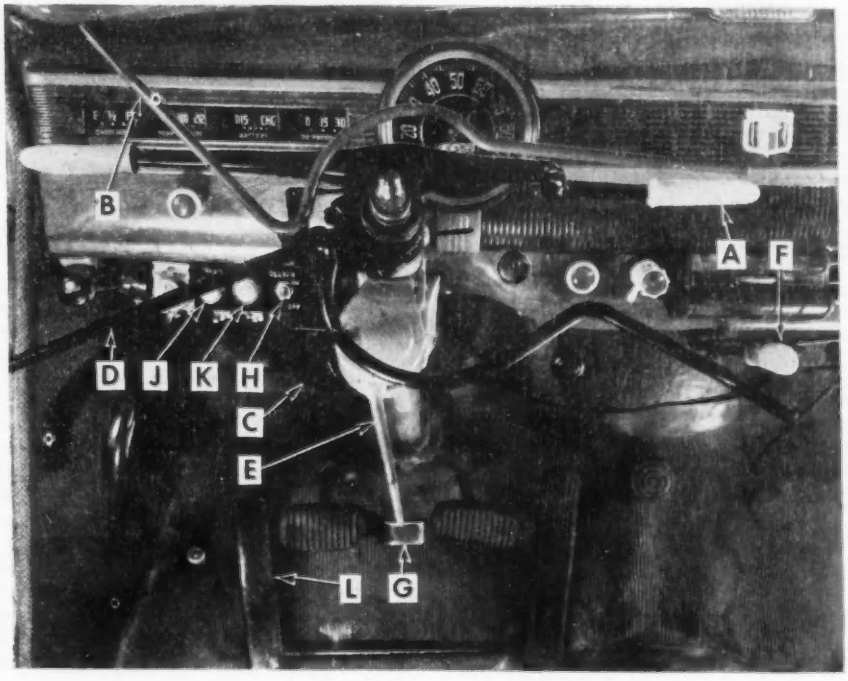
ENGINEERING project with humanitarian undertones is SAE War Engineering Board's recently delivered report on mechanical driving aids designed to provide disabled veterans of World War II with prompt restoration of privileges, pleasures, and jobs in operating motor vehicles. Important development work by the W.E.B. committee followed the detailed survey and cataloging of existing mechanical driving aids which was the first step in the committee's work. Throughout the project, the W.E.B. efforts were aimed at development of aids which would permit the specially equipped cars to be driven by normal persons without difficulty or confusion.

Although directed specifically to assisting disabled veterans, it is apparent that all disabled persons desirous of operating motor vehicles will ultimately benefit from the committee's findings.

Initiated at the request of the American Association of Motor Vehicle Administrators, and carried on with the wholehearted cooperation of the U. S. Army's Surgeon General, the report provides motor vehicle manufacturers, state vehicle administrators, and others with comprehensive data on driving aids for passenger cars and light trucks. Additionally, the project has undertaken pioneering work in equipping a test car with a complete set of basic mechanical driving aids and in conducting driving tests at veterans hospitals.

The project went all out in its objective of restoring to disabled veterans the chance to use and operate motor vehicles safely and effectively. The only current limitations upon use of the committee's results are wartime restrictions on materials and manufacturing operations. Until authorization is received from Government agencies to manufacture the devices outlined in the report, they will not be available.

The committee's work revealed clearly that prosthetic devices enable the vast majority of veterans war-bereft of limbs skillfully and safely to operate standard motor



Mechanical driving aids for wounded veterans have been combined on one car for test purposes, although no one veteran would need all the devices. Shown are (A) gear shift lever, (B) power brake lever, (C) power brake valve, (D) hand throttle, (E) electric direction signal, (F) hand starter lever, (G) pedal bar, (H) automatic clutch control, (J) foot-to-hand control light dimmer switch, (K) hand control dimmer switch, and (L) left accelerator pedal. Hand and foot controls may be extended either to right or left to meet amputee's needs

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vehicles. Increasing application of automatic clutches, transmissions, and drives is expected to help further this end.

Driving Easily Possible

Specific conclusions of the Board's Committee on Vehicle Controls for Disabled Veterans include:

- Prosthetic devices permit the majority of disabled veterans to drive motor vehicles without any special controls.
- Some standard equipment items needed by disabled veterans currently are available through normal trade channels; other simple, special units readily may be provided at any garage.
- Special controls, including those incorporating power assistance, required on some car models for use in cases of major disability, could be made available as soon as removal of wartime restrictions releases engineering personnel and production facilities.
- Mechanical aids and special devices can be installed more satisfactorily by automobile and accessory dealers and service stations than by car manufacturers.
- Cars so should be equipped with special controls that they may be normally operated by persons other than disabled veterans.
- Various state licensing authorities already are issuing driving licenses to disabled veterans after examinations and tests.

Simple Mechanical Aids

Progress reports of the Committee present a comprehensive word-and-picture summary of driving aids developed here and abroad, particularly Great Britain. The basic mechanical aids, as installed on the Committee's test car, include:

Steering wheel knob. Will be modified to provide greater ease and safety when used with artificial hands.

Steering wheel throttle and brake levers. Extend either to right or left, as amputee requires.

Hand starter control lever. Facilitates car operation by veterans with artificial legs.

Clutch pedal bar. Enables veteran with one leg to operate either clutch or brake, or both simultaneously.

Accelerator treadle extension. Permits operation by artificial left foot.

Electric direction signal. Assures safer operation of vehicle in traffic.

Hand service brake control. Installed in cases of leg amputation.

Automatic clutch control. Permits operation through accelerator treadle, or interconnected hand throttle control.

Hill holder device. Prevents car rolling back on incline.

Steering column gear shift lever. Extends to left or right.

Hand clutch control, mechanical.

Stirrup on clutch pedal.

Veterans are Capable

Preparation of disabled veterans for vehicle operation is furthered, the Committee's reports indicate, by practical muscular training which starts in the wards and continues until discharge. Result is that the veterans not only are normal in every respect except for wearing prosthetic devices, but actually are in better physical condition than civilians and, with some training, can handle themselves virtually as well. Furthermore, it has become policy at Percy Jones General Hospital, at Battle Creek, Mich., where initial driving trials were instituted, to train the veterans to handle motor vehicles and other machinery without aids other than prosthetic devices.

Current intention of the Committee is to make the data available to all motor vehicle manufacturers, and to others interested, with the recommendation that individual consideration be given to patents and other legal requirements. So far the project has been limited to the operation of passenger cars and light trucks on the theory that the handling of heavier vehicles is impractical and unsafe in view of the normally more rigid physical requirements.

Various Factors Considered

The progress reports indicate that the majority of driving aids already is commercially available. The few requiring special production include:

Left-hand extension of steering column gear shift lever; clutch pedal stirrup, interconnecting bar for clutch and brake pedals; hand throttle; hand clutch control; and hand brake control.

Two other developments are reported as being directly helpful. New York University Center for Safety Education is furthering research studies to ascertain methods of measuring the driving abilities of the disabled and to aid in improving techniques and testing methods used by licensing authorities. The Association of Casualty and Surety Executives has adopted the underwriting principle that, with due regard for public safety, automobile liability insurance will be available to the disabled on the same basis as to the general public.

The Committee on Vehicle Controls for Disabled Veterans consists of C. R. Patton of Packard Motor Car Co., project sponsor; J. H. Hunt, of General Motors Corp., chairman; R. H. McCarroll, of Ford Motor Co.; and H. T. Woolson, of Chrysler Corp. The Technical Subcommittee which has developed engineering details is comprised of the following:

Chairman, L. A. Chaminade, Chevrolet Motor Division, General Motors Corp.; W. L. Aiken, The Autocar Co.; W. J. Allard, Ford Motor Co.; H. S. Currier, Olds Motor Division, General Motors Corp.; W. A. Frederick, Willys-Overland Motors, Inc.; A. G. Laas, Studebaker Corp.; E. P. Lamb, Dodge Division, Chrysler Corp.; W. A. Mulhern, Chrysler Corp.; W. Norris, Hudson Motor Car Co.; J. Arthur Nyland, Buick Motor Division, General Motors Corp.; R. H. Phelps, Nash Motors; T. H. Thomas, Bendix Products Division; and E. A. Wren, Packard Motor Car Co.

At a recent two-day meeting at Peoria of the War Advisory Committee of the CRC, this important research group advanced the job of fitting fuels and lubricants to tanks, tractors, and trucks for combat service. The committee, of which C. G. A. Rosen, director of research, Caterpillar Tractor Co., is chairman, met with representatives of the armed services and leading U. S. industries. CRC is made up of representatives appointed by the API and SAE. Research work is carried on by nearly 300 working groups which include 2000 trained and highly skilled petroleum and automotive technicians. All findings of the groups are funneled through the Council to the Army. Front row, left to right, are: C. B. Veal, secretary, CRC; J. B. Macauley, Jr., Pratt & Whitney Aircraft Division; Genevieve Walmsley, assistant secretary, CRC; Lt.-Col. R. E. Jeffrey, Jr., Ordnance; C. G. A. Rosen, Caterpillar Tractor Co.; J. B. Fisher, Waukesha Motor Co.; W. M. Holaday, Socony-Vacuum Co., Inc., and A. L. Beall, Wright Aeronautical Corp. Middle row: Major R. F. Harvey, Corps of Engineers; Com. C. J. Livingstone, Office of Quartermaster, U.S.N.; Major V. A. Gates, Army-Navy Petroleum Board; Major H. N. Brownson, Ordnance; Major M. C. Landis, Ordnance, and Major L. E. Endsley, Jr., Quartermaster Department. Rear row: C. E. Jacques, Ordnance; J. E. Taylor, Gulf Research & Development Co.; J. J. Mikita, The Texas Co.; W. G. Ainsley, Sinclair Refining Co.; R. E. Ellis, Standard Oil Development Co., and W. R. Meese, Ordnance.

Combining Talent on Involute Spline Standards

Members of Subgroups No. 1 and 2 of Technical Committee 13 B-5, photographed recently at the Chrysler Engineering Building, represent a wide range of interest in this engineering problem. They are, front row, left to right: A. E. Leach, Pontiac Division, General Motors Corp.; P. T. Eisele, Warner & Swasey Co.; M. Maletz; Glenn Tinkle; John Wetzel; H. H. Gotberg, Colonial Broach Co.; H. J. Inch, Jr., and Clyde A. Young, National Broach & Machine Co. Standing, left to right: G. H. Sanborn, Fellows Gear Shaper Co.; William A. Siler, Delco-Remy Division, General Motors Corp.; W. L. Barth, General Motors Corp.; Edward Gillam; Walter Jones; Swan O. Bjornberg, Illinois Tool Works, and chairman of Technical Committee 13 B-5; L. Kluter; Nathan Finkelstein, Buick Motor Co.; Gustaf Carvelli, Wright Aeronautical Corp.; Charles H. Stanard, Buick Motor Co., and chairman of No. 1 Subcommittee; George L. McCain, Chrysler Corp.; J. B. Armitage, Kearney & Trecker Corp.; H. W. Fahrlander, General Machinery Corp. (in rear); B. P. Graves, Brown & Sharpe Mfg. Co.; R. E. Volk; W. A. Mulhern, Chrysler Corp.; H. A. Marchant, Chrysler Corp.; Charles H. Staub, Michigan Tool Co., and cochairman of No. 1 Subcommittee; Augustin J. Syrovy, Chrysler Corp; C. W. Enstrom, Illinois Tool Works, and J. P. Breuer, Barber-Coleman Co.

Involute Spline Project Benefits by Coordination

INCREASING use of the involute form of tooth for splines, first introduced because of their high load factor and more recently popularized in an untold number of applications, has resulted in accelerated joint committee work aimed at completing standards embracing pitch, tooth form, number of teeth, fits and standard pitch range.

The involute form of spline tooth not only is stronger than flat-sided form, but provides a better fit, and is manufactured more easily to close tolerances, and is usually cheaper.

The new standard is being developed by the SAE, American Gear Manufacturers Association, American Society of Mechanical Engineers, and the National Machine Tool Builders Association under American Standards Association procedure. Swan O. Bjornberg, Illinois Tool Works, is chairman of Technical Committee 13-B5, and its subcommittee on Involute Splines is headed by Charles B. Stanard, Buick Motor Co. The AGMA chairman is Charles R. Staub, Michigan Tool Co.

Among the important achievements have been the coordination of the SAE Aeronautical Standard, AS 84-A, on Involute Splines, developed by the Involute Spline Committee E-7, of the SAE Aeronautics Division, under the chairmanship of Gustaf Carvelli, Wright Aeronautical Corp.

The new standard will provide efficient durable splines applicable to practically all conditions, with a minimum of restrictions and limitations. The coordination with AS 84-A will result in a great deal of interchangeability between the rounded root spline and the flat-bottomed, flat-crested spline forms.

The committees have agreed to broaden the range of pitches.

Although cloaked in mystery, the origin of the involute form of tooth stems back as far as 1694 at least, when De la Hire, a French scientist, described the mathematics of this type of gear, and less than a century later a further study was published by Leonard Euler, a Swiss mathematician. Requirements for today's highly stressed splines for aircraft engine mechanisms have led to widespread adoption of the involute spline, and it is freely predicted that the square-formed tooth will soon be discarded, particularly in view of the wide use of modern gear cutting machinery.

AS 84-A (as revised 5/1/44) is for a shallow depth side bearing spline featuring a 30 deg pressure angle and a full radius at the root of the tooth teeth to decrease the stress concentration at the root to a minimum. It incorporates a stubbed tooth form. The ten basic pitches range from 6 to 48, and the depth or denominator is twice the basic pitch, and they range from 12 to 96.

Serving with Mr. Carvelli on the Aeronautics Involute Splines committee are J. L. Goldthwaite, Allison Division, General Motors Corp.; G. L. McCain, Chrysler Corp.; J. J. Osplack, Vinco Corp.; J. G. Perrin, Pratt & Whitney Aircraft, and G. H. Sanborn, Fellows Gear Shaper Co.

Members of Subcommittee on Involute Splines of Technical Committee 13 B-5 serving under the combined chairmanship of Messrs. Stanard and Staub are Harry H. Gotberg, Colonial Broach Co.; John P. Breuer, Barber Coleman Co.; Mr. Bjornberg; Mr. McCain; Albert E. Leach, Pontiac Division, General Motors Corp.; Nathan Finkelstein, Buick Motor Co., and Clyde A. Young, National Broach & Machine Co.

W.E.B. Gives Navy 4-Part Diesel Vibration Report

FOLLOWING nearly two years of computing involved mathematical calculations and conducting intensive tests and research, the special committee of the SAE War Engineering Board organized under the chairmanship of Board Member C. G. A. Rosen, Caterpillar Tractor Co., at the request of the Bureau of Ships, U. S. Navy, has completed the first of four phases of the problem of Torsional Vibration of Navy diesel engines.

Research engineers of Caterpillar Tractor Co., General Motors Research Laboratories Division, Chrysler Corp., and Fairbanks, Morse & Co. have delved into every phase of the problem with the best authorities of the Bureau of Ships, Naval Experiment Station, and Brooklyn Navy Yard.

The committee has visited the Portsmouth Navy Yard where studies were made of diesel installations in submarines. A special test program recently conducted at the Navy Experiment Station used improved types of torsiographs and calibrators developed by the committee.

The first complete report of the first

phase of the project is a 250-page book with some 50 pages of photographs, diagrams, charts, and curves.

Of outstanding importance in the realm of higher mathematics are the many pages of calculations covering the development of equations and formulas as contributed by Committeeman F. P. Porter of Fairbanks, Morse & Co.

Personnel of the Torsional Vibration Committee, together with contributors and consultants, follows: C. G. A. Rosen, Caterpillar Tractor Co., chairman; L. M. Ball, Chrysler Corp.; F. P. Porter, Fairbanks, Morse & Co.; T. C. Van Degrift, Research Laboratories Division, General Motors Corp.; S. T. Foresman, Chrysler Corp.; L. F. Hope, Research Laboratories Division, General Motors Corp.; J. F. Millan, Caterpillar Tractor Co., secretary; and F. G. Shoemaker, Detroit Diesel Division, General Motors Corp.

Com. Carl J. Vogt, U. S. Bureau of Ships, is the liaison officer between the committee and the Navy.

Contributors to the committee's activity were: J. O. Almen, General Motors Corp.; A. L. Boegehold, General Motors Corp.; C. Criswell, General Motors Corp.; W. L. H. Doyle, Caterpillar Tractor Co.; H. W. Fall, Caterpillar Tractor Co.; W. H. Frater, General Motors Corp.; C. W. Gadd, General Motors Corp.; A. Goloff, Caterpillar Tractor Co.; R. W. Halberg, Chrysler Corp.; F. M. Lewis, M.I.T.; Dr. Charles Lipson, Chrysler Corp.; D. B. Shotwell, Caterpillar Tractor Co.; H. R. Smith, Jr., Chrysler Corp.; J. D. Swannack, Fairbanks, Morse & Co.; E. E. Zimmerman, Chrysler Corp.; and A. W. Zmuda, General Motors Corp.

Torsional Vibration subcommittees and their chairmen are: Classification & Specification of Torsiographs, Mr. Ball; Revision of Navy Torsional Stress Specifications, Mr. Van Degrift; SAE-W.E.B.-Navy Test Program, Mr. Ball; Torsional Vibration Data Summary Form, Mr. Porter; and Torsional Calculation, Mr. Hope.

Navy consultants include: Capt. L. F. Small, Capt. T. G. Reamy, Com. J. E. Canoose, Com. J. P. Den Hartog, Lt.-Com. George Humphries, G. J. Dashefsky, and E. C. Magdeburger.

Car Body Standards Will Be Undertaken

PASSENGER car body standards will be developed by the new SAE Passenger Car Body Division, Chairman E. C. DeSmet announced on April 18, at the organization meeting of the new group.

The Division was authorized by recent action of SAE Council upon the recommendation of a group of passenger car body engineers who have felt the need of standardization in that field.

General scope of the new division's work will cover body, body parts and equipment, dimensional standardization, nomenclature, etc. Some of its projects, it is expected, will be handled jointly with other SAE standards divisions.

Subjects decided upon at the first meeting as those on which standardization studies should be started were:

Window and door glass, with tolerances on sheet sizes and thicknesses, and standard bottom radius;

Window channels;

Window regulators, particularly in reference to the direction of rotation;

Door handles, and their shank sizes and direction of rotation;

Body nomenclature, such as the structural members, their location and designations, and

Fiber and cardboard, with physical properties.

Chairman DeSmet pointed out that in some instances standardization work may be in progress by other groups, and offered to coordinate such projects to prevent overlapping.

Considerable discussion centered about the question of drafting room practice, such as drawing sizes, arrangement of views, projections, dimensioning, and so forth, with view of preparing a code for recommended practice to achieve uniformity within the industry and suppliers of body parts.

Serving on the division with Mr. DeSmet,

Rambling Throu ecti

Attracting a gathering of over 350 members and guests – the greatest turn-o to a **CHICAGO SECTION** Passenger Car Meeting since the pre-war auto sh days – D. G. Roos, vice-president of engineering, Willys-Overland Motors, Inc., to his interesting and informative story of the development of the jeep . . . (Th paper, which was delivered at the Oct. 12 Metropolitan Section meeting, was gi a detailed abstract in the December issue of the *SAE Journal*) . . . Office of W Information film of the jeep illustrated the vast scope of its use by the U. S. Army and a Willys-Overland movie demonstrated post-war possibilities of the vehicle various fields . . .

Advantages and limitations of porous chrome for reduction of wear and salvaging of automotive parts was of practical interest to more than 80 fleet ope ators who attended the April 10 dinner meeting of the **PITTSBURGH SECTION** . . . Speaker H. Van der Horst, president of the company bearing his name, sa porous chrome is too brittle to be used where there is impact or bending, asserting that if 0.001 in. of the metal were plated on copper and the copper dissolved, th chrome could be broken with the fingers . . .

New applications in automotive fields have been opened up by the use o silicone compounds – materials which deny such established beliefs as: putty doesn't bounce; oil becomes thick at low temperatures and thin at high temperatures; filte paper filters; insulating materials are damaged by extreme heat . . . At **MOHAWK-HUDSON GROUP'S** May 14 meeting, Dr. Donald F. Wilcock, chemical engineer, General Electric Research Laboratory, spoke on "Bouncing Putty," a silicone produc which has upset one of the "facts" of chemistry . . .

Capacity audience of 450 crowded dining hall of Prince Edward Hotel i Windsor, Ont., at **CANADIAN SECTION** April 20 meeting, where such SAE celebrities as Past-President W. S. James, Detroit Section Chairman R. N. DuBois, and Windsor Regional Vice-Chairman Ernest L. Simpson graced the head table...

Some of the headtableites at the record Windsor meeting of the Canadian Section are (l. to r.): R. H. McCarroll, executive engineer, Ford Motor Co.; W. E. McGraw, Section past-chairman; E. F. Riesing, guest-of-honor speaker; W. H. Funston, Jr., president, Firestone Tire & Rubber Co. of Canada, Ltd.; Section Chairman W. A. Wecker; and Ernest L. Simpson, head, automotive engineering, Ford Motor Co. of Canada, Ltd.

and where E. F. Riesing, Firestone Industrial Products Co., gave an encore of his paper "Synthetic Rubber and Future Possibilities," previously presented at the SAE Annual Meeting in January . . . Mr. Riesing stated again that the war's end will not mean the death of the synthetic rubber industry, but rather its expansion into many new industrial fields . . . A series of demonstrations proving the high resilience and superior resistance of certain substitute rubbers effectively emphasized the efficiency of these materials . . .

Over 250 aircraft engineers gathered at **SOUTHERN CALIFORNIA SECTION'S** April 19 meeting to hear Howard Field, Jr., consulting engineer, discuss Reduction of Vulnerability of Aircraft Hydraulic Systems, and Waldo D. Waterman,

Section Reports

terman Research Engineering Co., talk about the history of the modern tricycle ding, the tailless flying wing, and the roadable airplane . . . Mr. Waterman sented two separate cinema reels which showed actual aircraft which he built, cessfully maneuvered, and exhibited at the National Air Races . . . J. D. Redding, representative of the SAE aeronautic department, gave an illuminating trav- gue of his recent trip to Great Britain, where he attempted to effect international ndardization of aircraft components . . .

San Diego Group of Southern California Section heard William C. Wold, nsolidated Vultee Aircraft Corp., discuss Post-War Transcontinental Commercial lines at the regular monthly luncheon feeting April 17 . . . Predicting a bright ure for commercial aviation, Mr. Wold believes that the cost of operation per ton le decreases as the size of the airplane is increased. He foresees an operating cost 4¢ per ton mile for scheduled airline flights from San Francisco to New York . Cargo air transport has prospects of being more important than passenger air nsport post-war, he declared, with the carriers devoted primarily to transport of ishable goods . . . This phase of aviation evoked keen interest from the 85 sons present . . .

Projecting thinking about brake improvements into the post-war period, ETROPOLITAN SECTION'S T & M meeting May 10 was a striking example of e value of careful planning to a successful session . . . More than 500 turned out spite rain to hear a symposium which included suggested use of airplane brake sign on trucks and buses by H. F. Schippel and R. J. Keller, B. F. Goodrich Co.; port of development of an electrical braking system employing the eddy-current nciple by J. George Oetzel, Warner Electric Brake Mfg. Co.; and a description a new brake by R. K. Super, Timken-Detroit Axle Co. with a demonstration of plastic and metal working model . . . Vice-Chairman T. A. Drescher introduced st-Chairman Austin M. Wolf as moderator, and prepared discussions were esented by Gavin W. Laurie, Atlantic Refining Co.; E. N. Hatch, N. Y. Board Transportation; and John V. Bassett, Raybestos-Manhattan Inc. Among the dience were these Met Section past-chairmen: Merrill C. Horine, Lt.-Com. S. G. lden, USNR, John F. Creamer, T. C. Smith, Walter Peper, Herbert Happersberg, d Mr. Wolf.

Excellent chicken dinner was enjoyed at the April 23 meeting of the RACUSE SECTION, where over 45 members were made mellow by the singing radio star Priscilla Gillette . . . Technical fare was offered by E. B. Etchells, neral Motors Corp., whose discussion of anti-friction bearings dealt mainly with e plain type . . . Variety of self-explanatory slides accompanied his talk, which ched briefly on bearings of the ball and roller type, and explained why their use some points of internal-combustion engines has been restricted . . .

Service engines equipped with porous-chrome cylinders have shown 1/24 rmal cylinder wear and 1/5 normal ring wear when compared to cast-iron linders, according to Russell Pyles, chief engineer, Van der Horst Corp. of America, o told MIDCONTINENT SECTIONITES May 4 that it is necessary to have rous chrome for lubrication because ordinary dense chrome is not wet by oil . . . reviewed the method whereby "channel" type porous chrome is obtained by ctrolytic deposition.

While plastics have a definite place in the future of the automotive industry, great deal has to be done to realize the all-plastic car, members of ST. LOUIS CTION were told by Clark L. Richards, Plastics Division, Monsanto Chemical ., on April 17 . . . The most promising plastics developments for use in the field, declared, are abrasion-resistant sheets for windows; low-pressure bonding plastics panels and fenders; and weather-resistant fabric coatings which will outwear ther . . . Mr. Richards was most optimistic about the applications of synthetic ins, claiming them to be far superior to such modern plastics as protein and llulose . . .

Stressing the relation between proper design and welding technique, Leo Berner, ief welding engineer, Joshua Hendy Iron Works, and William Waldrip, presi- nt, Waldrip Engineering Co., submitted a paper on welded diesel engine frames the May 8 meeting NORTHERN CALIFORNIA SECTION . . . Cooperation tween designer, engineer, and executor leads to best results, it was emphasized . . .

SAE Helicopter Group Studying Design Factors

ADVANCING engineering information about helicopters, three meetings of the new SAE Special Aircraft Projects Subdivision's Committee S-2 have been held with helicopter engineers and representatives of component manufacturers.

Among the troublesome problems, difficulties with universal joints have been disclosed and are being studied. In the power drive, the universal joint has imposed upon it a constant load with little variation in the break angle, unlike the varying break angle in ground vehicles. A joint study of the problem is now under way by members of the committee and engineers from universal joint and bearing manufacturers.

The optimum powerplant for helicopters is a constant speed, variable power unit. Manufacturers of this type of aircraft are interested in a "hovering" power rating, as it is expected that a large percentage of its time in the air will be spent in hovering. Maximum power is required for checking descent; however take-off ratings are important because it can be foreseen that in this type of operation, take-offs will be required under extremely difficult conditions.

The conventional thrust bearing is not needed in helicopter engines, and its elimination, it was pointed out, might save as much as 10 lb in the larger units.

Engine manufacturers have met with Committee S-2 on these questions, as well as on the general problem of cooling the engine and oil. In present designs, the engine is "buried" in the ship presenting difficult cooling problems.

Four subcommittees have been formed to study and report on the following engineering projects:

Design and testing of transmissions;

Procedures for testing ground resonance, or the phenomenon of a reaction to the rotors from the earth at low altitudes;

Design characteristics for wheel brakes, and

Design criteria for universal joints.

Under the chairmanship of R. H. Prewitt, Kellett Aircraft Corp., members of the Helicopter Committee S-2 are: M. E. Gluhareff, Sikorsky Aircraft; J. P. Perry, G. & A. Aircraft, Inc.; F. N. Piasecki, P-V Engineering Forum; Stephen H. Rolle, CAA; M. C. Smith, Platt-LePage Aircraft Co.; R. A. Wolf, Bell Aircraft Corp.; Com. R. E. Doll, Navy Bureau of Aeronautics, and Major K. S. Wilson, AAF Air Technical Service Command.

Copper Alloys Reviewed

SAE standards on copper-base alloy specifications have just been reviewed to indicate revisions and additions necessary to bring them up to date with latest industry requirements.

Begun at a recent meeting of Subdivision B of the Non-Ferrous Metals Division of the SAE Standards Committee in Detroit, the review is designed particularly to render these standards entirely suitable for postwar use. The situation as regards critical materials was given full consideration by the subdivision in making its analysis.

Designed primarily for automotive use, these SAE copper-base alloy specifications have been correlated as far as possible with ASTM standard specifications which have been written for industry in general.

Willys-Overland Motors, Inc., are E. L. Allen, Schontizer Engineering Co.; I. L. Carron, Detroit Harvester Co.; Walter T. Fahleigh, consulting engineer; H. A. Flomus and F. W. Kateley, ACF-Brill Motors Co.; W. A. Graf, Edward G. Budd Mfg. Co.; E. J. Luxmore, Chevrolet-Central Office Division, General Motors Corp.; G. J. Monfort, Chrysler Corp.; D. G. Renno, International Harvester Co.; E. D. Scott, Ford Motor Co.; D. R. Stamy, Standard Products Co.; L. A. Stewart, Mack Mfg. Co., and T. Vigmostad, Briggs Mfg. Co.

A second meeting of the new division is scheduled to be held on June 4 in Detroit, during the Detroit Section's important Local War Emergency War Materiel Meeting. At that time, it is planned to add molding and clips for car bodies to the list of subjects decided upon for study by the division.

REVOLUTIONARY JET PROPULSION

Works Metamorphosis On Plans and Planes

▪ Philadelphia, April 11

(Summary of paper on "Jet Propulsion" by Ben Hamlin, development engineer, Bell Aircraft Corp.)

JET propulsion in its present form as applied to airplanes differs from rocket action in that the latter carries both the fuel and the oxidizing agent, which mix and burn to produce high pressure. The jet propulsion engine is dependent on the oxygen in the earth's atmosphere for its operation, and therefore cannot leave it, while the rocket could theoretically travel to the moon.

The engine is surrounded by a housing which resembles roughly a small, stubby airplane fuselage entirely open at the front. Due to the action of the rotary compressor, and assisted by the motion of the plane when in flight, air flows in through this intake duct and is delivered under pressure to the combusion chamber. In this chamber the air is heated and expanded by the burning of the fuel, which is kerosene, introduced through the nozzles. The expanding gases then flow through a turbine which is mounted on the other end of the compressor shaft and supplies the power to operate the compressor. From the turbine the gases are exhausted through a nozzle to the rear. The reaction of this powerful jet drives the plane forward at great speed.

Engines have a rotational speed of 15,000 rpm, and the temperatures in the turbine are about 2000 F, and at the tail pipe, 1000 F. When the plane is in the air there is a faint trail of smoke.

Compared to propeller-type planes, the following are advantages which jet propulsion offers:

1. Higher air speed and higher altitude possible than with the conventional plane.
2. Efficiency increasing with speed.
3. Simplicity, since each engine has only one moving part as compared with the hundreds of moving parts in the modern airplane engine. There is no carburetor, and no ignition after the operation is begun.
4. Ease of starting. An electric motor is used to turn over the compressor shaft and build up pressure in the combustion chamber. Fuel is introduced and ignited by an electric spark. There is no warming up period, an advantage in cold climates.
5. Safety, as there is less fire hazard with kerosene as fuel than with gasoline.
6. The plane is much lower because of no propeller. This results in shorter landing gear, which is much lighter. Jet propulsion engines can be located anywhere on the plane, simplifying design of the plane.

7. Ease of control. The only engine control is the throttle.
8. No vibration.
9. When approaching head on the jet propulsion plane is noiseless. As it passes over, the sound is like that of a railroad train crossing a high trestle.
10. Invisible at night.

The only serious disadvantage of the jet propulsion plane is its high fuel consumption.

Rough Terrain Conquered By Off-Highway Vehicles

by MERRILL C. HORINE
Mack Mfg. Corp.

▪ Oregon, Jan. 19

(Excerpts from paper entitled "Engineering Features of an Off-Highway Truck")

UNLIKE commercial vehicles, off-highway trucks are not generally considered as transport vehicles, but rather as operating tools, along with bulldozers, power shovels, crushers, and mixers.

From the earliest days of motor transport, there have been three classes of off-highway trucks, namely:

1. Adaptations of standard highway vehicles.
2. Specially constructed vehicles, built up of standard components.
3. Wholly specialized vehicles in which components specially designed for the service are employed.

The Mack LMSWM, rated at 60,000 lb gross vehicle weight for off-highway service, is of the latter type, designed and built specifically for the strenuous service of the exploitation fields. For adequate flotation and traction on soft and slippery footing, it is a six-wheeler with drive on all four rear wheels and with a weight distribution which apportions the loads equitably between the 10 tires, all of which are of the same 12.00-24 size.

Powered by gasoline or diesel engines and geared for a wide range of ratios in 10 speeds, these vehicles are capable of maximum speeds on level concrete of from 31.4 to 33.5 mph, and of a maximum tractive effort in low gear at peak torque of from 33,000 to 45,000 lb, sufficient on an average road to climb a 54 to 76% grade with a gross vehicle weight of 60,000 lb.

Final drive is through a four-wheeled, all-wheel-drive rear bogie of maximum capacity.

A special type of transmission was developed for this vehicle of the unit powerplant type, bolting directly to the engine flywheel bell housing, so that its main pinion or stem-gear shaft forms the clutch shaft.

All gears are of spur type and of tetraploid form. No less than 12 antifriction bearings are employed in this transmission, tapered roller, annular roller, and annular ball types being used in various locations according to the duty imposed.

In addition to the conventional oil bath lubrication, positive pressure oiling is used for the spigot bearings and all free gears. This is secured by eccentric vane pumps forming a part of each of the two-stem gears, which force the lubricant through drilled passages in the shafts to the free-gear bushing journals.

Control is by two levers, one of which shifts the five primary speeds and the second, the compound, in the usual manner.

Drive to the four rear wheels is by a four-wheeled bogie, employing straight-through drive by dual reduction gears. This bogie is provided with three differentials, one inter-axle and one in the carrier of each axle. The sequence of drive from the driveshaft is first to the inter-axle differential, one element of which is connected with hollow quill-type bevel pinion of the forward axle carrier, and the other with a shaft running through the former and connected with the rear carrier bevel pinion by an inter-axle driveshaft with two universal joints.

The bogie is trunnioned to the frame and the axles suspended from the trunnion by two long, inverted semi-elliptic springs.

Brakes are air-actuated, using a Westinghouse 2-cyl water-cooled 7½ cu ft compressor, direct-acting, self-lapping treadle valve; quick release valve for the front brakes and relay valves for the rears. Wheel brakes are of the rigid-shoe expanding type with constant-lift cams bearing on renewable follower plates on the shoe tips.

On tractor models, there are three trailer brake systems. The first is synchronous with foot brakes; the second is through the hand-control valve; and the third is an interconnection with the trailer brakes and the tractor hand brake assist, so that when the hand brake is applied, the trailer brakes as well as the rear bogie brakes are applied.

Considering the strenuous service for which these vehicles are built, the frame must be of massive construction. The side members are of chrome-manganese steel, 10½ x 3¼ x 5/16 in. thick, reinforced full length by an inside channel ¼ in. thick. On long wheelbase types, for oil field work, there is also a fish-plate reinforcement extending from the forward bogie trunnion bracket to the front spring hanger.

Because cooling is of such prime importance, a particularly robust type of radiator has been adopted. The core itself is of the flat-tube, continuous-finned type and carried between cast tanks by steel-cast side-plates, so that the core is relieved of all stress. It is equipped with a pressure cap to reduce losses from expansion and surge, reduce aeration, and prevent evaporative loss of antifreeze. The fan is fully shrouded to the radiator.

Whether gasoline or diesel engines are installed, the exhaust is through a stack extending vertically through the hood. Of three parts, the engine hood is constructed

of heavy-gage steel. Its top is in one piece, retained by four bolts at the center. The sides are single plates which hook onto the upper section and are held down by large spring hold-downs.

Completely enclosed, the cab has been specially equipped and mounted to withstand the rigors of off-highway service. All glazing is of extra-thick, nonshatterable glass and the door glasses are bound in metal. Three, instead of two hinges are used on the doors, and an extra-heavy door check and hardware are applied. To provide good vision, the cab is mounted appreciably higher than on highway models and on extra-long mounting springs.

BRIEFINGS

FROM PAPERS AT SAE MEETINGS

Devise Controls for Piston Temperatures

by PROF. E. T. VINCENT
University of Michigan

▪ 1945 War Engineering-Annual Meeting

(Excerpts from paper entitled "Piston Development Review")

PISTON temperature is of such importance in the successful operation of any internal-combustion engine that it appears feasible to re-introduce the subject by reviewing three papers presented at the 1944 SAE National Diesel-Fuels & Lubricants Meeting: "Adequate Piston Cooling As a Means of Piston Temperature Control" by Gregory Flynn, Jr., and Arthur F. Underwood; "An Analysis of the Heat Flow into Pistons" by Carl H. Paul; and "The Effect of Piston Design on Piston-Ring Sticking" by Harry F. Bryan.

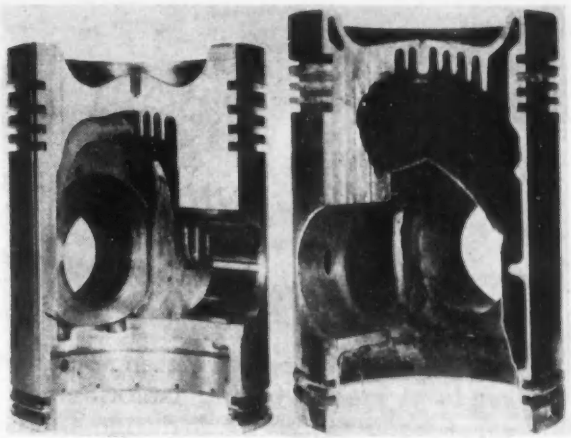
The papers presented two basic ideas (illustrated in Fig. 1) regarding the means of controlling piston temperature:

a. Provide an adequate conducting path for the heat flow from the piston crown to the cylinder wall.

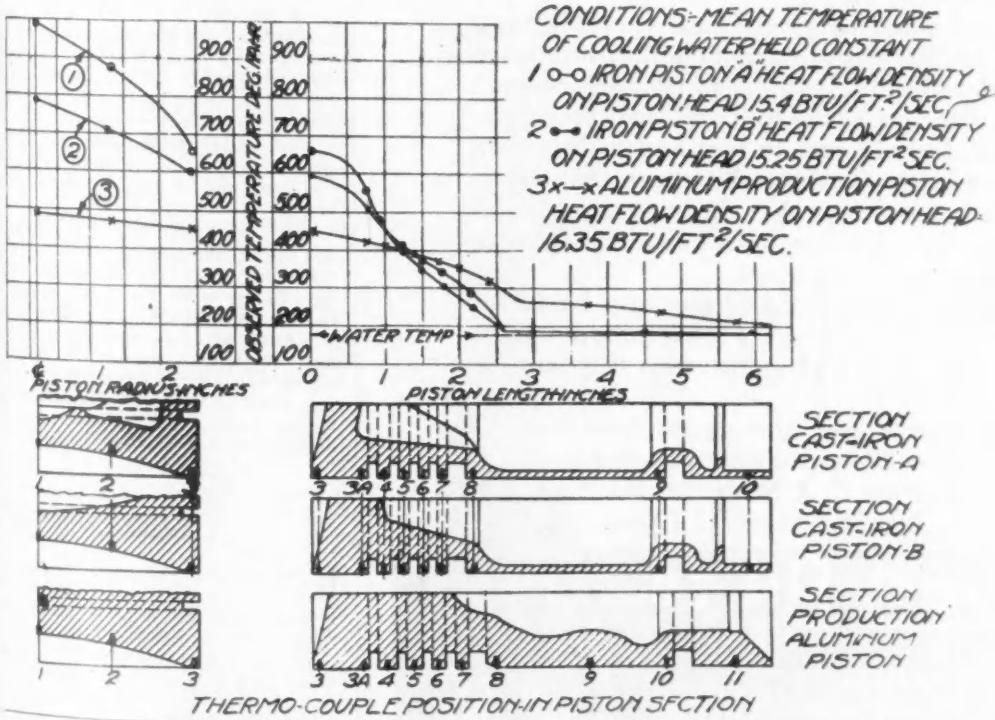
b. Prevent flow to the cylinder wall and remove heat from the head by auxiliary means.

Taking the case of a piston of any given type operating in an engine with some definite power output, and having some constant combustion chamber shape, it is obvious that the heat flow to the piston crown is of constant magnitude, almost independent of the type of piston employed.

Mr. Paul's paper indicated that even the fluctuation of the temperature during the cycle is of negligible magnitude. As a result, the metal temperatures will increase



▪ Fig. 1 – (left), typical aluminum diesel piston; (right), typical iron General Motors diesel piston: 8½ x 10 in. 2-cycle engine (from paper by G. Flynn, Jr. and A. F. Underwood)



▪ Fig. 2 – Effect of material and design on piston surface temperature International Harvester Co. piston test bench (from paper by H. F. Bryan)

up to a point where the heat loss from the piston is exactly equal to the heat input. The resultant metal temperature is low as the heat can escape with little difficulty and increases as the resistance path is increased. Thus, a design according to (a) is always at a moderate and safe temperature under all conditions of operation within the heat capacity for which it was designed. Type (b) is safe only so long as the auxiliary cooling means (the lubricating system) continues to function in a satisfactory manner.

One point of great importance on which there still seems to be divergence of opinion is the path the heat follows. It is advocated that the experimenters in this field put forth a combined effort to obtain an exact idea as to the relative merits of the various paths for heat flow. Basic data of this type will lead to an accurate and exact design for the best overall type.

The problem of heat flow and design is best illustrated in Fig. 2 where comparisons of cast iron and aluminum pistons are made. The aluminum design results in metal temperatures producing heat flow over the skirt, resulting in higher temperatures at points remote from the head. This is not a handicap provided that the maximum temperature at any point is below the critical producing oxidation of the oil.

The real economical solution to the piston design problem may not be in lots of high conductivity metal, securing low temperatures accompanied by high heat losses, or in a relatively non-conducting metal, well cooled and fitted with heat dams; but in a combination of the two, such as an iron or similar metal at the heat-receiving surface and an aluminum or similar alloy at the heat disposal surface. Such pistons have been used successfully in some very high output aircraft engines.

Another important point on which difference of opinion exists is the use of scuff bands on the top land. By employing contact over the whole ring belt, including the top land, one discusser pointed out that aluminum temperature was reduced to such a low value that no difficulties were encountered, at least up to 0.31 hp per cu in. Contact had the distinct advantage of reducing piston temperature greatly—opposing the generally accepted idea that lack of contact in this region is preferable, since it avoids very high temperature.

The use of scuff bands is in effect employing the top land to dispose of some of the heat, and as such, is highly recommended.

One other factor of major importance discussed at the meeting was the effect of the width of the ring face in contact with the cylinder wall. Experiments seemed to indicate definitely that both reduced blowby and metal temperatures accompany reduced face. No reason is seen why an oil engine should still continue to employ rings wider than some of the modern gasoline engines which have cylinder pressures almost double that of an average oil engine.

Discussion

COMMENTING on Prof. Vincent's remarks on piston crown temperatures it was stated that measurements of these temperatures show that in many cases with aluminum pistons, the isothermal lines are nearly parallel to the top of the piston, so that the heat flow is straight through the crown. Most of the heat received by the piston crown is therefore delivered to the

air and oil in the crankcase, it was concluded.

Regarding piston rings, one speaker asserted that heat generated by friction must be taken into account, and maintained that the skirt of the piston can have little effect in helping to cool the crown, because of the length and small cross-section of the heat path. The consensus of opinion was that to properly study heat flow in a piston or other engine part it is essential to have numerous measurements of actual temperatures along the heat path.

It was suggested that research on the heat conductivity of various metallic joints and contacts under varying pressure and thickness of oil film would be very desirable, and would answer many piston problems.

One idea that was strongly expressed was that it is best to keep the heat as much as possible in the combustion chamber, or at least to localize it as much as possible and then control any hot spot to a comfortable living temperature for lubricating oil.

Packaging May Be Economic Scourge Of Air Transport

by THOMAS WOLFE
Western Air Lines

at 1944 National Air Cargo Meeting

(*Excerpts from paper entitled "Shipping by Air"*)

IN the efficient and economic distribution of goods by air, probably no factor is more important than that of packaging.

New Methods for Packaging

Considerable thought has been given to the preloading of cargo in containers or on platforms before loading in the airplane. Cargo engineers recommend that uniform standard containers be established in which packages or commodities without any packaging can be placed. This would result in considerable reduction in packaging requirements and tare weights, simplify tie-down problems and permit maximum efficiency in handling and loading at terminals.

Design and construction of these airborne containers should embrace the following characteristics: light weight, inexpensive, and re-usable; ability to resist rough handling; strength to protect loading; cover to retard pilferage; and shaped to facilitate quick loading with a minimum of voids.

New Materials for Packaging

Much progress has been made toward the development of new materials in an effort to reduce to absolute minimum the weight and size of the protective covering necessary for shipment by air.

Strongly advocated for air shipment of small odd-shaped items is the use of thin, lightweight, but strong corrugated material which combines the protective quality of corrugated paper with the folding qualities of heavy-kraft wrapping paper.

Fiber containers, corrugated and solid, are believed to play the biggest role in the shipment of goods by air, since they incorporate such important features as light weight, resistance to compression, shock absorbency, insulation, and relatively low cost.

Plywood, because of its light weight and strength, is also receiving considerable attention. A molded plywood container which has been developed offers great possibilities in shipping and storing explosives, oil, rubber, and chemical products which have a corrosive reaction on metal.

Another wartime use of plywood in shipping containers is a plywood box developed for smokeless powder. This box, lined with paper-thin sheets of noncritical alloy steel permanently bonded to plywood, is used in place of the former copper and tin-lined lumber box.

In the aluminum field, a new thin-walled container capable of hermetic sealing when necessary, and developed for the use of the food and pharmaceutical industries is expected to find application in the post-war packaging field. Principal advantage is the saving in weight it affords.

Containers for Perishables

The importance of packaging in the cost of transportation of perishables is manyfold. The decrease in the weight of the container

will decrease the unit transportation cost. Also, packaging the product in the producing area into consumer-sized packages should serve to reduce handling costs.

One of the main problems in connection with shipment of perishables by air is the effect of lower temperature while the plane is flying in high altitudes with the possibility that the cargo may freeze. Precooling, coupled with proper insulating package covering, is expected to preclude installation of heavy refrigeration equipment in the plane in cases where there is a chance of perishable cargoes becoming overheated on the ground or at low altitudes in low climates. Cooler temperatures of high altitude should serve to offset this problem.

Containers for Overseas Shipments

In determining the most serviceable shipping container for export shipments by surface transportation, the U. S. Department of Commerce has suggested that the following points must be borne in mind:

1. Nature and value of the article.

2. Unloading facilities at the port of destination.

3. Climatic conditions en route and in the country of destination.

In view of these factors, it appears that packing for export shipments for surface transportation necessitates stronger, heavier, and bulkier packages than are required for air transportation.

The lighter weight of container requirements for air shipment will have the advantage of reducing import tariffs in those countries where assessments are made on the basis of gross weight, legal weight, or tare weight.

Post-War Materials Brighten Future of Automotive Fabrics

by MORRIS SANDERS
Industrial Consultant

▪ *1945 War Engineering-Annual Meeting*

(Excerpts from paper entitled "Wartime Fabric Developments of Significance to the Automotive Industry")

THERE are certain ideals which have been set down for automotive fabrics, and war needs have hastened the attainment of these ideals, which are:

1. *Long life and ability to take hard wear.*

Vinylidene chloride is a filament that is exceedingly tough, fatigue- and abrasion-resistant and long-lived, although it is still relatively harsh to the touch. Other synthetics that wear well are the vinyl polymers, whether used in sheet form or as impregnants and coatings for yarn and fabric.

2. *Maximum style and beauty for luxurious and smart trim effects.*

With the exception of synthetic rubbers (buna N, buna S, and butyl rubber) the new synthetics are color-receptive in the extreme; and because they are soil-resistant we are no longer forced to choose colors that blend in with grease and grime.

3. *Ease of handling.*

Because completely scientific control of fiber, filament or sheet is assured, and because many of the new materials can be solvent- or heat-treated, they will be easier to handle than their predecessors.

4. *Elasticity and softness for comfort.*

Many of the new synthetics are elastic by nature. Weave design is as important as the fiber itself where elasticity and comfort are goals. There have been new weaves of acetate rayon, for example, that feel good, look good, and stand up very well. There have also been other worthy developments employing chemically treated viscose rayons.

5. *Ventilation for dissipation of body and interior heat.*

Due to their physical structures, synthetic filaments and fibers are intrinsically cooler than standard natural fibers, and they can be manufactured in weaves that are at least equally open and well ventilated. One recent development is a vinyl latex that is susceptible of water dispersion and protective coagulation about individual fibers. We may expect water-repellent fabrics that are permeable to air and, because of the nature of the vinyl sheath, resistant to flame and abrasion as well. Another promising use of vinyls permitting free ventilation is via the plexon method, whereby individual yarns are impregnated and coated.

6. *Maximum resistance to spotting and ravages of accumulated road dust and dirt.*

Most of the new synthetics are grease- and dirt-resistant and are cleaned with relative ease. Rayons, nylon, vinylidene chloride and the vinyls are largely unaffected by mildew, sunlight, and the average destructive agent normally encountered in everyday use.

Other than upholstery developments, there are new solutions to sidewall and head-lining problems. By means of coatings and impregnants, rayon and cotton prints can now stand unusually rough abuse without losing any of their dainty design quality. Besides such synthetic-treated soft goods, durable, structural, hard-surfaced laminates will be available in exactly the same designs and patterns.

Where sound absorption is a major consideration, all-fiberglas or fiberglas in combination with rayon, cotton, wool or other fibers are to be considered.

Considering top materials for convertibles, high-tenacity rayons, nylon, and fiberglas tops that are tough but very light are possibilities. Due to wartime vinyl developments, these materials can be coated translucently with synthetics that resist flex, age, oil, and weather, as rubber never did. Also, rigid, structural, fabric-based, compound-curved laminates are a development that applies to specialized auto body problems — to tops, fenders, panels, and other parts.

New fabric laminates which are heat- and weather-resistant, and which can be post-formed for angled, corrugated, and simple curved surfacings, can mean enduring, plaid-surfaced station wagons, flowery designs for the sides of florists trucks, and similarly well-chosen patterns for other commercial delivery vehicles. It can also mean dimensionally-stable bus ceilings that are opaque by day but translucent when back-lighted for night use.

Above all, it means more freedom of action for the designer and engineer; more appeal to buyers.

Military Planes Ignore Costs

by COL. CLYDE H. MITCHELL
Air Technical Service Command

▪ **Southern Ohio, Dec. 15**

(Excerpts from paper entitled "Development of Military Aircraft During Wartime")

MILITARY aircraft, unlike commercial aircraft, makes no pretense at being economical. The bomber's job is to get to its target in a hurry, carry a big load, and be armed well enough to fulfill its mission and return to its base.

Any aircraft is a compromise between many desired features — speed, range, firepower, high-altitude performance, and rate of climb. The items to be given most consideration in adjusting the design of these compromises are dictated by the type of mission to be performed, the opposition against which the aircraft is to operate, and whether

the plane is to be used on the offensive or defensive.

One of the predominant factors on the items bringing about a compromise is the horsepower available in relation to the weight. In the early months of the war our fighter airplanes were equipped with liquid-cooled engines of about 1200 hp and a critical altitude of 13,000 to 25,000 ft. Through improvements, the engine most generally used at that time has been increased to 1600 hp, and an additional liquid-cooled engine has been brought into the picture developing about 1600 hp with a critical altitude of about 30,000 ft. Our fighter airplanes are now powered with an aircooled engine that develops 2800 hp from 2800 cu in. displacement.

Development of engines for other types of aircraft, especially bombers and transports, has gone along similar lines.

The years 1942 to 1944 showed considerable improvement in high speed and rate of climb of our fighter airplanes. By 1944 we had reached a sea-level high speed of about 360 mph, which was twice the high speed of our 1930 airplane and about 20% above that of the 1940 plane. Speed at 10,000 ft averaged about 400 mph, which was an increase of 25% at this altitude over [illegible] years; the speed at 20,000 ft was 420 mph, which was 30% greater; and our top speed averaged about 440 mph at 30,000 ft. It is at this height that our tremendous improvement occurred, for at this altitude we have increased our high speed almost 60%.

Our comparisons from sea level and throughout the whole range are favorable against both the Germans and Japanese.

Regarding rate of climb, however, we found that the Japanese in the South Pacific could always outclimb us, and therefore could maneuver and regain their altitude advantage. So, choosing between high speed and rate of climb, in 1942 we were able to push our rate of climb at sea level up to an average of approximately 3800 fpm – a 100% increase over 1930 when our rate of climb was 1900 fpm – and at 20,000 ft we achieved an average rate of climb of 3000 fpm, twice that available in 1940 and more than seven times that of 1930. In our newest fighters we have a rate of climb at 30,000 ft of 1700 fpm.

Increases of this magnitude in the power of our airplanes have naturally resulted in increased gross weight. In designing aircraft to carry such increased weights and in improving them so that such weights may be added to existing designs, we have never disregarded the factor of strengthening the plane structure.

Although increased gross weight and installation of additional equipment created problems of maintaining exact balance, we have always been able to keep to maximum standards of stability and controllability – two factors involved in balance.

To attain high gross weight without great sacrifices in safety features, it has been necessary to improve such things as tire strength, brake capacity, design of flaps, and other equipment to a great degree.

Air Cargo Extending Markets for Flowers

by ROBERT L. SMITH
Mission Nurseries & Florists, Inc.

So. California, Jan. 11

(Excerpts from paper entitled "Perishable Air Cargo Today")

A NEW merchandising development which is worth promotion and discussion is the air shipment of flowers and plants from southern California to all points of the globe.

Here a whole new industry is being created by technological means. From the transportation phase, markets heretofore inaccessible to southern California flower growers are now a matter of hours away by air freight. From the packaging phase, technological improvements have produced streamlined, stronger, lighter, precooled cartons which make it possible to deliver flowers halfway around the globe as fresh as the hour they were picked. From the growing phase, much scientific progress has been made in the preparation and germination of seed, and in commercial fertilizers,

which more than ever enable flower growers to capitalize on the area's climatic advantages.

There are unlimited merchandising and sales possibilities in camellia corsages picked in San Fernando Valley in the morning, packaged in individual acetate containers in Hollywood by midday, and air flown to New York where the next morning they are on sale at a department store flower counter.

This is only one of the industries where new markets will be unlocked, as a result of the technological progress which has been brought about as a result of World War II – and about which scientists and engineers should demand some of the glory.

Predict Refinements In Post-War Diesels

by TOM J. COLLINS
Cummins Diesel Engine Co.

Salt Lake Group, Feb. 12

(Excerpts from paper entitled "Post-War Diesel Engines")

POST-WAR automotive diesel engines which will be successful will make a steady, consistent advance with the present basic engine. These improvements will be brought about by a better volumetric efficiency, which is accomplished by more highly developed manifolding and porting design; a better valve port area to cylinder displacement ration; and by separating intake from exhaust manifold whereby the incoming air to a diesel engine can be maintained at a cooler temperature. The cooler the air, the more atoms of oxygen contained in any given volume – and in a diesel engine, oxygen is a very important part of the engine's success.

Another feature of the post-war diesel engine is that it will be of materially larger piston displacement and slightly faster in its rpm, since the trucking industry demands faster time between its terminals and its ports of shipment. As a result, horsepower will have to be stepped up to negotiate the adverse grades of our present highways with our 70,000 to 75,000 lb loads at triple the speeds we are now making. Engines, therefore, will have to be large enough to have sufficient horsepower to move these loads up the 6% grades at speeds ranging from 12 to 18 mph, as compared to speeds of 7 to 9 mph as we know them today.

Lightweight alloys will also find their way into the high-speed automotive diesel engine field, but it will be a very slow process, as every move will have to be justified through the laws of economics.

Many interior refinements will be made in engines – an outstanding one being the "hob-nail piston" where oil is led in channels closely parallel to each other, leaving a small amount of space between the channels for direct rubbing contact. This is supposed to reduce the chances of piston contacts and scoring pistons. Crankshaft bearings are also undergoing intensive study.

The supercharging principle for automotive diesel engines will come into its own in the post-war transportation era because it offers a healthy increase in the horsepower per pound of weight ratio. Blowers on the post-war automotive diesel engine will be as satisfactory as any other integral part of the engine, because progress has been made in blower design and construction so as to enable the blower to produce many times as many miles of trouble-free service as was experienced with the original blowers.

Blowers in their early inception were made with aluminum impellers and aluminum housings, and under the adverse conditions under which engines have to operate, it was found that these blowers were not entirely satisfactory for heavy-duty service. Therefore, it was necessary to change their construction slowly and progressively from aluminum alloy construction to iron construction—but the changes were made in slow distinct steps.

The post-war automotive diesel will be a much improved version of the present engine. It will represent a composite of several fine points, and will undoubtedly turn out more horsepower per pound of weight for a longer period of time between overhauls.

Air Cargo Supplements Land Transport

by R. D. KELLY
United Air Lines

▪ 1944 National West Coast T&M Meeting

(Excerpts from paper entitled "Air Cargo, A Problem of Cooperation and Coordination between Carriers on the Ground and in Flight")

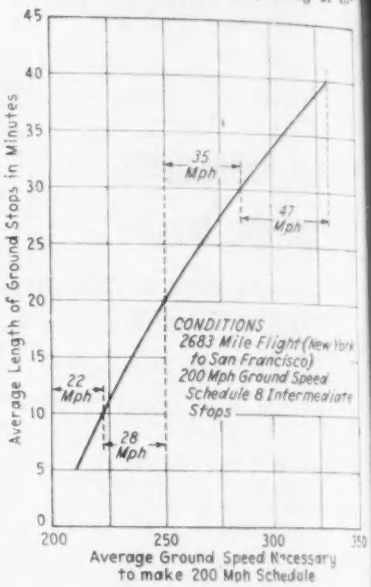
IT is impossible to set up flight schedules which approach the speeds of modern aircraft unless the total ground time is kept at an absolute minimum through a reduction of the number of stops, and unless those stops are very short in duration.

Aircraft manufacturers now well recognize the importance of expending engineering effort on every item which will reduce ground time. Ground pickup, handling and distribution, and delivery are of just as much concern to the airline operator as are his own operations.

Because high-speed transportation delays are costly (see Fig. 1), it is obvious that economy in the handling of air cargo calls for more elaborate time-saving devices. This basic fact must be realized by ground handling organizations and carriers if they are to do their part in an effective, efficient air transportation system.

Two other fundamental factors which are part of the proper engineering analysis of this cooperative problem are frequency of service and schedule reliability.

Frequency of sevvice by both carriers is essential in order to take advantage of the air carriers' speed. If a package must wait before starting its journey because of infrequent schedules, then the service suffers the same as for similar delays in transit. Thus, air cargo must be moved promptly, and large cargo airplanes operating at infrequent intervals will not be able to compete with smaller craft which operate more often.



▪ Fig. 1 – Effect of ground stop time on average speed necessary to make schedule

The maintenance of the highest standard of schedule reliability is a necessary adjunct to making the most effective use of air cargo service. Here again, regularity and dependability of the ground carrier must equal that of the air carrier. This cannot be attained, however, without the benefit of modern improvements, nor by haphazard methods of operation.

A current fallacy is that a slow airplane, with a large wing area, should be able to transport cargo at a cost to compete with surface carriage. This is not true except in cases where, due to mountains, swamps, and other obstructions to surface transportation, the cost of constructing roadbeds and highways, and the greater length of routes, overbalances the cost formula so that the airplane has an advantage due to its ability to operate directly between two airports, regardless of the intervening terrain.

The only way the airplane has of improving its economic position with respect to the ground vehicle is to operate at as high a speed as is practicable, consistent with airport design, safety, powerplant aerodynamic and structural limitations.

There can be no direct competition between the carriage of cargo by air and by surface transportation. The two services are supplementary, and every effort should be made by each to cooperate with the other in order to benefit from the swiftness of air transport for the carriage of goods to distant areas.

NEW MEMBERS Qualified

These applicants who have qualified for admission to the Society have been welcomed into membership between April 10, 1945, and May 10, 1945.

The various grades of membership are indicated by: (M) Member; (A) Associate Member; (J) Junior; (Aff.) Affiliate Member; (SM) Service Member; (FM) Foreign Member.

Baltimore Section: Thomas F. Covington (A), G. Bernard Fenwick, Jr. (M), Alfred H. Harley (J), Frank Iannuzzi (A), John Till (A).

Buffalo Section: L. C. Bates (A), Le Roi J. Bisson (M), Linus J. Rausch (M).

Canadian Section: George Tay Berner (A), Hugh W. Gregory (A), James Stuart Johnston (J), Erik C. Maase (A), Albert B. Rimert (A), Leonard Wakeford (M).

Chicago Section: Scott B. Barnhardt (J), Charles J. Boyd (A), W. D. Carlson (M), J. K. Dickey (M), Gerald A. Fisher (J), Virgil L. Gunder (M), Ernest William Hedeen, Jr. (J), William W. Henning (M), Norman F. Hindle (M), Willis Abbott Johnson (M), A. W. Mall (A), Ralph E. Powers (J), Henry Y. Ruby (A), William Chenault Thompson (J), Joseph L. Tourtelot (A), Robert H. Wellman (J), Guy F. Wetzel (M).

Cincinnati Section: J. H. Garlough (A), Arthur J. Sikora (M).

Cleveland Section: Dwight M. Allgood (A), Henry E. Alquist (J), Harold E. Friedman (J), Arthur D. Glaize (A), Raymond E. Greenough (M), J. Robert Henry (M), Harold J. Knaggs (A), Everard Francis Kohl (M), Paul W. Kuckuck (A), Grant W. La Pier (J), Vincent Lawrence LaValle (J), Dana Willis Lee (S M), Wayne Emerson Martin (M), Frank Louis Mauro (J), George Robertson Miller (J), Charles L. Paxton (A), Benjamin Pinkel (S M), M. B. Rath (A), E. H. Recker (A), Charles L. Smythe (A), Cleveland C. Soper (M), Thomas R. Spalding (A), Lorain Norton Vandervoort (J), Ray W. Wellenberg (M), Edmund M. Winegar (M), John Wischhusen (J), Merritt A. Zimmerman (J).

Detroit Section: Noah L. Alison (M), Lester L. Beltz (M), Russell H. Bennett (A), Harry L. Brinck (A), Glenn M. Brown (M), David Scott Burnett (A), J. Nall Candler (M), Fred W. Carr (J), William Irvin Chapman (J), J. W. Duhn (M), Louis B. Forman (M), Garnett H. Gallaway (M), Ronald A. Gatenby (J), Wallace McQuown Grube (J), Ronald K. Hatch (M), Leroy A. Howard (J), Harry Kezerta, Jr. (J), Clarence R. Lunn (M), George Wallace Matthews (J), Hugh D. McKinnon (M), A. Emmet Nix (M), Robert Ellwood Onley (A), Geo. Alexander Preston (M), Donald Arthur Reynolds (A), Carl H. Scheuerman, Jr. (J), Alfred E. Stocker (M), Roy P. Trowbridge (J), George Vlaich (J), Frank E. Wickham (A), Gerald D. Wilson (M), Ernest R. Wonders (A).

Hawaiian Section: Robert L. Campbell (M), B. J. Eaves (A), Ronald A. Henderson (J), T. Clifford Melim (A), William Bowers Meredith (M).

Indiana Section: Kenneth M. Armantrout (M), James William Ball (M), Floyd H. Dreyer (A), Max B. Miller (M), Carl D. Stephenson (M), Harry L. Stewart (A), Horace A. Taylor (M).

Metropolitan Section: Robert M. Barth (J), Eugene Behun (J), John P. Bertram (A), Charles Norman Carlstrom (A), Michael G. Danias (J), Alfred J. Ferraro (A), Geoffrey Gilbert (M), Raymond P. Heron (J), Leonard C. Hillmuth (A), Otto J. Kammerer (A), Donald Bruce Lane (M), Jack M. Lipman (J), Capt. Bartholomew C. Loskot (S M), Kenneth M. Magee (M), Lt.

Theodore Paul Mayer (J), Rene Louis Rocher (A), Matthew J. Ryan (A), Grant Elbert Scott, Jr. (J), Frank Shanahan (A), James H. Sharp (A), Marvin Stern (J), Carmen Stra (A), Edward Karl Sundstrom (J), Charles Suntag (J), Jeremiah F. Toomey (A), Everett C. Winget (A), John Charles Zjawin (J).

Mid-Continent Section: A. L. Haskins (A), 2nd Lt. Edwin E. Kuckein (J), A. J. Mc Clelland (A).

Milwaukee Section: Arnold J. Ristow (M).

Mohawk-Hudson Group: Edward J. Edwards (M).

New England Section: Russell A. Beauchemin (A), Lt. Col. G. E. Ledbetter (A), W. F. Mahan (A), George A. Smith (A), George P. Wilson (J).

Northern California Section: Glenn C. Beever (A), Arthur C. Bolton (A), Ernest Reynold Donner (A), Harold L. Gravem (A), Edward Lamory Kearney (M), John W. Ronan (M), Charles Paul Steinmetz (J).

Northwest Section: Howard A. Fear (A), Gaylord Weld Newton (M), Lowell S. Norman (A), D. H. Seiter (A), Clarence M. Wynn (A).

Oregon Section: Tinsley Davis Miller (A), Walter L. Wagner (A).

Peoria Group: Paul B. Benner (M), Raymond Zanes Brown (M), William E. Irwin (J).

Philadelphia Section: Walter Allison Caskie (A), Ensign Harry L. Showalter, Jr. (J), Virgil W. Ware (A).

Pittsburgh Section: Charles F. Hammer (M), Thomas C. Moore (A).

St. Louis Section: Christy Clair Butterworth (M), Ellis Victor Ford (A), Walter E. Lang (A).

Southern California Section: George B. Adams (A), James B. Atkisson (J), John E. Cregier, Jr. (A), Robert H. David (J), David George Gannon (A), Robert Arnold Garrison (A), Ralph Stuart Gibbs (J), Richard J. Graebner (M), Robert A. Hoffman (A), John W. Kochendorfer (A), Robert Golden Koger (J), Frank L. Landon (A), William G. Letts (M), Loyd Van Lovell (A), Chester Eugene MacMasters (J), J. H. Marsden (J), Donald J. Naumann (M), Robert O'Hanlon (A), Victor J. Plotkin (A), Henry A. Powis (A), Kenneth W. Schmidt (J), Clifford E. Smyser (A), Raymond B. Stringfield (M), Lt. Col. Kenneth Arden Woolsey (A), O. L. Woodson (A), Robert J. Wright (J).

Southern New England Section: Ralph P. Alex (M), Howard Wallace Butler (J), Norton Dale Eagon (J), J. Owen Eames (M), William Henschke (M), Harold A. Johnson (A), Sidney E. Miller (M).

Dayton Section: Wallace A. Crismore (S M), Allan Curtis Hoffman (M), Raymond E. Rader (J), Howard E. Rehnborg (J), Hugh C. Robbins (A).

Spokane Group: J. R. Bryan (A), John J. Clapp (A), Peter J. Favre (A), Lt. Glen D. Grant (A), Donald M. Grimes (A), William S. Hamilton (A), Henry G. Williams (A).

Syracuse Section: Gerd H. Grieshaber (J), Camille Robert Lemonier (M).

Texas Section: Paul G. Crawshaw (A), J. C. Edmondson (A), H. Vaughan Wilcoxson (A).

Washington Section: Suren I. Akopian (M), James F. Angier (S M), Ralph Frank Broberg (J), M. S. Burkov (M), Lt. Com. E. E. Krogstad (A), E. P. O'Neill (A), Capt. Leonard Herndon Witt (A).

cont. on p. 48

APPLICATIONS Received

The applications for membership received between April 10, 1945, and May 10, 1945, are listed below. The members of the Society are urged to send any pertinent information with regard to those listed which the Council should have for consideration prior to their election. It is requested that such communications from members be sent promptly.

Buffalo Section: Harold P. Henderson.

Canadian Section: John A. Hines, Albert Langford Lee.

Cincinnati Section: Lee A. Roth, John W. Wollering.

Chicago Section: Earl E. Anderson, Barnard C. Cerutti, Warren G. Daley, Carl W. Ericzon, Jr., Roy W. Green, E. L. Newman, Walter James O'Donohue, Frank B. Quackenboss, Jr., Robert R. Saylor, H. K. Stenstrom, B. I. Ulinski, Irving F. Veltum, John Vernerd Venema, Nicholas Zasiebida.

Cleveland Section: John Charles Freche, John James Jacklitch, Jr., E. G. Kimmich, Michael Joseph Markowski, Bert E. Price, Raymond James Vokaty, Edmund E. Wood.

Detroit Section: Edward C. Bahm, Glenn L. R. Baumhardt, Paul Butler Best, Jr., Edwin M. Booth, Jr., John J. Bush, Carl F. Caris, Fred Madison Cousins, José Luiz Palhares dosSantos, Donald E. Duerow, Robert Henry Dusevoir, Joseph W. Eskridge, Wilfred R. Fox, John A. Geisler, Matthew E. Hamilton, Harold V. Hansen, Cecil W. Johnson, Bruce W. Johnston, Howard F. Kidwell, William H. Kieber, Roger M. Kyes, Wade Lamb, A. F. Lapp, Harold A. Lassen, Edward Latta, Earl D. Loomis, Henry W. Mackey, Vern C. Markley, Jr., Michael Marvosh, Capt. Lewis Edward Michael, Alxeander George Middler, Lt. (j.g.) Frederick Garner Pettit, Jr., Robert B. Rothwell, Robert Louis Spicer, James Hugh Stone, Bruce K. Tice, Beryl VanLierop, Dean Alvin Walters.

Indiana Section: H. W. Dietrich, Henry Leonard Elfner.

Kansas City Section: William L. Beach, Frank A. Carleton, Spencer W. Deming, William S. Fidlar.

Metropolitan Section: Jerome G. Abbott, Forrest M. Barney, Harry Warren Burdett, Ashley S. Campbell, R. Decat, John Raymond Dennis, Fred L. Elsaesser, David Feld, Harold Ferman, George C. Fowler, William C. Howell, Jr., Arthur Hull-Ryde, Douglas F. Jeffrey, William E. Klein, Richard Steven Lewis, Harry L. Norton, David W. Paull, Edward H. Regan, Richard R. Reinheimer, Henry George Rudolph, Jr., William E. Spearman, Edward John Wilkens, Raymond F. Wilson, William Bert Wosenitz.

Mid-Continent Section: Herbert D. Putnam.

Milwaukee Section: Arthur W. Pohl.

New England Section: Nicholas Carabetses, Howard G. Davis, John V. Holmes, John J. Manning, R. H. Rilee, Lt.-Col. John G. Sheehan, Sidney S. vonLoesecke.

Northern California Section: Theodor Ehrlich, Ray Thomas Olson, Carroll F. Reeves, Edward Smith Ross, Thomas J. White.

Northwest Section: Vernon Damm, Henry E. Harris, Harold P. Henderson, Carl N. Klitgaard, Paul P. Olson, Robert Shaffer, William L. Wheeler.

Oregon Section: Tom E. Allen, Fred C. Gordon, Robert W. Westcott.

Philadelphia Section: W. Newlin Keen, Lt. Edwin B. Stafford.

Southern California Section: Francis C. Anderson, Albert E. Baak, Capt. Frank W. Bailey, L. A. Billington, J. H. Binns, Reginald Brenchley, George H. Coulson, Malcolm B. Cummings, L. Burch Davis, Theodore E. Dickey, Ronald E. Eggert, Thomas C. Farris, Aubrey E. Fraser, Franklin L. Gardner, Joseph C. Gill, William Day Groseclose, Robert Edwin Hartsock, Charles B. Hatler, P. A. Haythorne, Albert C. Heath, William F. Hoy, James M. Hunnell, Joe Ming Jay, John William Kelly, Ralph George Kessler, David J. Kipp, William H. Koehler, Paul Krikscus, Jr., Harry Kuehl, Spyro Kyropoulos, William P. Langsfeld, Donald L. Leavitt, Edward Bernard Lundeen, Joseph F. MacCaughtry, Frederick A. Matheson, Horace Edwin Mead, Clarence W. McKenzie, M. G. McKinney, Richard C. Meredith, Victor Klifton Muzik, Norman F. Nichol, Melvin Nelson Osborn, Warde L. Parker, Paul Harold Parks, Eugene Leonard Pfeiffer, John S. Poplin, Stewart H. Potter, Don M. Rainey, Willard Henry Reineking, Rollin K. Reiss, Eugene V. Reynolds, Maynard S. Reynolds, Alfred C. Robinson, Lawrence J. Roy, John A. Ruthven, Nicholas J. Salters, H. C. Schultz, August F. Schulze, Harry Bernard Seed, Kenneth T. Sprague, Jr., Fred H. Squires, Ernest Smith Standley, Joseph O. Strong, Philip L. Sullivan, Ralph Swaisgood, Verne Elroy Sylvester, Jack C. Urban, Arthur J. Wadsworth, Eric Weiss, T. Ross Welch, Roman Wieckowski, Zargous Zoraster.

Southern New England Section: Joseph I. Robinson.

Southern Ohio Section: David D. Bowe, Raymond J. Darga, Richard E. Gould, A. B. Reese, Jr., James Edward P. Sullivan.

Spokane Group: Charles J. Dow, Spokane United Railways, James J. Williams.

Syracuse Group: Charles William Summons, John D. Williams.

Texas Section: O. W. Brown, R. W. Cantwell, Manuel H. Gorin, W. C. Hildebrand, Jr., Robert C. Pote, Byron Elwood Snow, Billie F. Tullis, James W. Walker.

Twin City Group: Orin B. Johnston, Russell Huber Whempner.

Washington Section: Thomas W. Bohton, B. H. Hasselbring, N. S. Khanine.

Outside of Section Territory: Harold A. Cook, Arthur Dawe, Harry L. Day, John Forbes, Frank Pembroke Huckins, Andrew I. Johnson, Bal D. Kalelkar, Edwin William Niemi, Howard L. Overman, Russell Wade Seniff, Lt. John Henderson Whyte, Clarence Henry Wiegman, Wei-Sheng Wu.

Foreign: Joseph Foster Cardwell, Africa; William E. Cooper, England; Owen Finlay MacLaren, England; Premier Automobiles, Ltd., India; Peter Alan Coles, England; Frank Woolley, England.

New Members Qualified

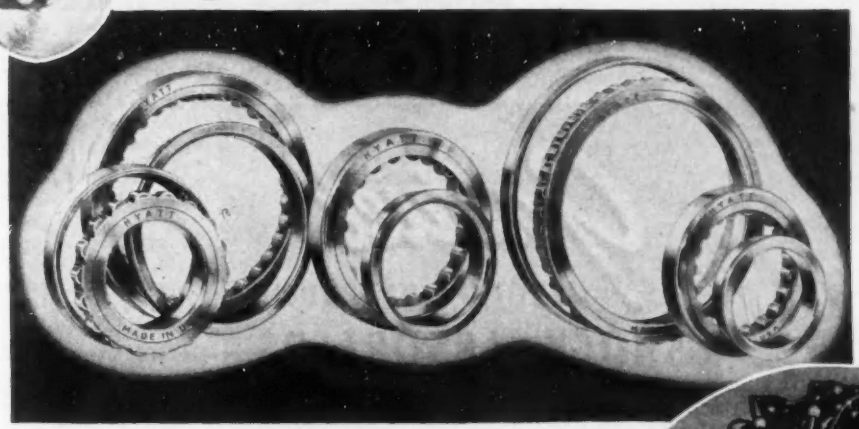
cont. from p. 46

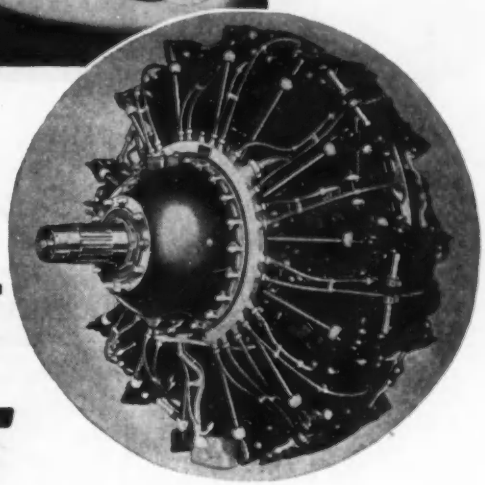
Western Michigan Section: Kenneth R. Christensen (A), Charles Locke (M).

Wichita Section: 1st Lt. John B. Cole (J), Everett H. Lock (A), Clarence Elton Swafford (J).

Outside of Section Territory: Edmond Louis Baker (A), Lt. Col. Richard Arthur Harding (M), Major Bernard James Highfield (M), Lt. Edward M. Kaliff (J), F. I. L. Lawrence (M), John C. Mock (A), Lt. Henry S. Morton (A), E. Merideth Roberts, Jr. (A), T/Sgt. Harrold H. Searing (J), Lt. John Gordon Thompson (J), Edward Zwerdling (J).

Foreign: Luis Edmundo Alvarez (J), (Chile); George Mann (F M), (England); Robert Marcus (A), (Palestine); V. F. Rodionov (M), (Russia); Lt. John George Romeril (J), (England); John Clement Sanford (F M), (Australia); Joseph Henry Temple (A), (England).





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About SAE Members

cont. from p. 25

IRVING B. BABCOCK, president of Aviation Corp., has been elected chairman of Consolidated Vultee Aircraft Corp., succeeding Tom Girdler, who resigned. Mr. Babcock was formerly vice-president of General Motors Corp. and president of GMC Truck & Coach Division.

A. R. ARMSTRONG, who is connected with Chase Brass & Copper Co., has been transferred from the Waterbury, Conn., to the Chicago plant.

Formerly designer, Buffalo Foundry & Machine Co., **JOHN R. QUINZIO** is now affiliated with Carborundum Co. of Niagara Falls as maintenance engineer.

EARLE F. TRAISE is no longer associated with Buckeye Service & Supply Co., Cincinnati, having joined Wilkening Mfg. Co. (Canada) Ltd., Toronto, Ont., as assistant to the general manager.

C. H. BRITTEN, who is employed by Shell Oil Co., Inc., has moved from Wilmington, Calif., where he was acting assistant to the refinery manager, to San Francisco, where he is manager of product application and development.

LT.-COL. CHARLES E. BATSTONE, U. S. Army Air Forces, has received the Legion of Merit award for exemplary service rendered during the invasion of France. Col. Batstone, who has seen over two years of service in Africa, France and Italy, is a past-chairman of the SAE New England Section.

RICHARD L. NELSON has been promoted from lieutenant (jg) to lieutenant, USNR, and is now cross-country officer at the U. S. Naval Air Station, Glenview, Ill.

C. N. RILL, who had been chief chemist, Nox-Rust Corp., Chicago, is now with the Valvoline Oil Co., Franklin, Pa.

JOHN C. LUTTRELL has joined Northeast Airlines, Inc., East Boston, Mass., as director of engineering. He had been assistant project engineer, American Airlines, Inc., as well as chief engineer of materiel maintenance, project section, headquarters, Air Transport Command, Gravelly Point, D. C.

R. L. OBLINGER has been promoted from first lieutenant to captain in the U. S. Army Field Artillery, Fort Sill, Okla.

S. A. SILBERMANN is a partner of the Metallurgical Service Co., Indianapolis, Ind., and is serving as chief engineer for the company. He was formerly president and chief engineer of Allied Engineering & Equipment Co., Inc., same city.

Formerly an apprentice seaman, U. S. Navy, stationed at the University of California Naval Training Unit, Berkeley, Calif., **WILLIAM L. BREYER** is now attending Midshipman's School at Columbia University, N. Y.

SAE members who have been transferred within their companies include: **WARREN VAN R. GILBERT,** Aluminum Co. of America, has been transferred from the Monroe, Mich., to the Cleveland, Ohio, branch of the company; **RAY E. DAY,** Aluminum Alloys Corp., has been transferred from the Detroit branch of the company to the one in Beverly Hills, Calif., and **WARREN M. MERRILL,** General Engineering & Design Co., who was formerly in the Detroit branch, is now with the Los Angeles, Calif., branch of the company.

Formerly technical adviser on transportation, Royal Army Service Corps, Middle Eastern Supply Center, Cairo, Egypt, LT.-COL. **RICHARD H. QUINNELL** is now managing director, Rowhurst Forge, Ltd., Leatherhead, England.

COM. W. E. LARNED, USNR, formerly chief staff officer, Atlantic Wing, Naval Air Transport Service, Naval Air Station, Patuxent River, Md., may now be reached c/o Fleet Post Office, San Francisco.

EDWARD B. SHIELDS, JR., U. S. Navy, has been transferred from Naval Air Transport Service, Seattle, Wash., to the Naval Detachment, Ames Aeronautical Laboratory, National Advisory Committee for Aeronautics, Moffett Field, Calif.

Formerly at Aberdeen Proving Ground, Md., **J. J. SIMON,** a private in the U. S. Army, is now stationed in Detroit and is serving as a field correspondent for *Army Motors Magazine*, an Army Ordnance publication.